



# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACOLOGY

(HUMAN ANATOMY AND PHYSIOLOGY)

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

### Programme Outcomes:

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

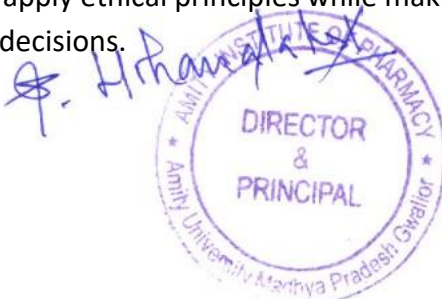
**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.



**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**Programme Specific Outcomes:**

**PSO 1:** Will be able to design, develop and implement efficient software for a given real life problem.

**PSO 2:** Will be able to apply knowledge of AI, Machine Learning and Data Mining in analyzing big data forextracting useful information from it and for performing predictive analysis.

**PSO 3:** Will be able to design, manage and secure wired/ wireless computer networks for transfer and sharing of information.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

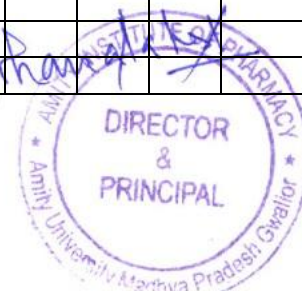
1: Slight (Low),

2: Moderate (Medium)

3: Substantial (High)

If there is no correlation, put “-”

PROGRAMME ARTICULATION MATRIX																
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
I SEM																
	BP101T	3	1	2	-	1	3	2	1	3	2	2				

*[Handwritten Signature]*  




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<b>DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING</b>
<b>Course Handout</b>
Course : HUMAN ANATOMY AND PHYSIOLOGY – I THEORY
Course Code : BP101T, Crédits : 04, Session :2023-24 (Odd Sem.), Class : B. Pharm. 1st Year
Faculty Name : Dr. Mandeep Kumar Singh

**Introduction:** This course is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.

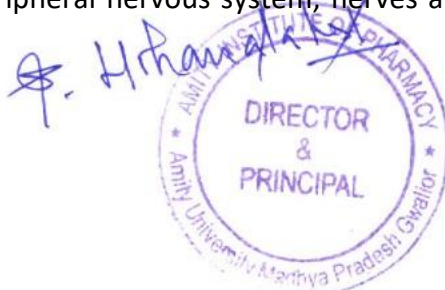
**Course Outcomes:** At the end of the course, students will be able to:

**BP101T.CO1.** Explain the gross morphology, structure and functions of various organs of the human body. Define and explain the anatomy and physiology, various levels of organizations basic homeostatic mechanism.

**BP101T.CO2.** Describe the various process of cell communication and homeostatic mechanisms and their imbalances. Explain the morphology, physiology of skeletal system along with the physiology of muscle contraction in co-ordination with the joints, their articulation and skin.

**BP101T.CO3.** Identify the various tissues and organs of different systems of human body and give the protection to human body as integument, support as skeleton system. Explain and describe the composition, function of various body fluids like blood and lymph, their significance and related disorders.

**BP101T.CO4.** Perform the various experiments related to special senses and nervous system. Classify the peripheral nervous system, nerves and morphology of special senses.



**BP101T.CO5.** Appreciate coordinated working pattern of some vital organs of specific system. Explain the anatomy and physiology and parameters related to CVS and related disorders.

**A. Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

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**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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**B. Programme Specific Outcomes:**

**PSO 1:** Will be able to understand anatomy and physiology of human body system and how the human body maintain internal environment so that different organs perform work properly.

**PSO 2:** Will be able to give the information about how the cell communicate and maintain their functions and various disorders of different human organs so that we can give the appropriate therapy.

**PSO 3:** Will be able to understand organization at the different level of human body.

**Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	3%
	Student – Teacher interaction	S-T I	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>



## C. Syllabus

### Unit I

- Introduction to human body Definition and scope of anatomy and physiology, levels of structural organization and body systems, basic life processes, homeostasis, basic anatomical terminology.
- Cellular level of organization Structure and functions of cell, transport across cell membrane, cell division, cell junctions. General principles of cell communication, intracellular signaling pathway activation by extracellular signal molecule, Forms of intracellular signaling: a) Contact-dependent b) Paracrine c) Synaptic d) Endocrine
- Tissue level of organization Classification of tissues, structure, location and functions of epithelial, muscular and nervous and connective tissues.

### Unit II

- Integumentary system Structure and functions of skin
- Skeletal system Divisions of skeletal system, types of bone, salient features and functions of bones of axial and appendicular skeletal system Organization of skeletal muscle, physiology of muscle contraction, neuromuscular junction
- Joints Structural and functional classification, types of joints movements and its articulation

### Unit III

- Body fluids and blood
- Body fluids, composition and functions of blood, hemopoiesis, formation of hemoglobin, anemia, mechanisms of coagulation, blood grouping, Rh factors, transfusion, its significance and disorders of blood, Reticulo endothelial system.
- Lymphatic system Lymphatic organs and tissues, lymphatic vessels, lymph circulation and functions of lymphatic system

### Unit IV

- Peripheral nervous system: Classification of peripheral nervous system: Structure and functions of sympathetic and parasympathetic nervous system. Origin and functions of spinal and cranial nerves.
- Special senses Structure and functions of eye, ear, nose and tongue and their disorders.

### Unit V

- Cardiovascular system Heart – anatomy of heart, blood circulation, blood vessels, structure and functions of artery, vein and capillaries, elements of conduction system of heart and heart beat, its regulation by autonomic nervous system, cardiac output, cardiac cycle. Regulation of blood pressure, pulse, electrocardiogram and disorders of heart.



#### D. Examination Scheme:

Components	A	CT	S/V/Q/HA	STI	EE
Weightage (%)	4	15	3	3	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination; A: Attendance

#### E. Suggested Text/Reference Books:

1. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brothers medical publishers, New Delhi.
2. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
3. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co,Riverview,MI USA
4. Text book of Medical Physiology- Arthur C,Guyton andJohn.E. Hall. Miamisburg, OH, U.S.A.
5. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.

#### F. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Definition and scope of anatomy and physiology, levels of structural organization and body system.	Lecture	Unit-1 CO1	Mid Term-1, Quiz & End Sem Exam
2	Definition and scope of anatomy and physiology, levels of structural organization and body system.	Lecture	CO1	Mid Term-1, Quiz & End Sem Exam
3	Definition and scope of anatomy and physiology, levels of structural	Lecture	CO1	Mid Term-1, Quiz & End Sem Exam



	organization and body system.			
4	Revision of Definition and scope of anatomy and physiology, levels of structural organization and body system.	Tutorial	CO1	Mid Term-1, Quiz & End Sem Exam
5	basic life processes, homeostasis, basic anatomical terminology.	Lecture	CO1 CO2	Mid Term-1, Quiz & End Sem Exam
6	basic life processes, homeostasis, basic anatomical terminology.	Lecture	CO1 CO2	Mid Term-1, Quiz & End Sem Exam
7	basic life processes, homeostasis, basic anatomical terminology.	Lecture	CO1 CO2	Mid Term-1, Quiz & End Sem Exam
8	Quiz	Tutorial		Mid Term-1, Quiz & End Sem Exam
9	Structure and functions of cell, transport across cell membrane, cell division, cell junctions.	Lecture	CO1 CO2	Mid Term-1, Quiz & End Sem Exam
10	Structure and functions of cell, transport across cell membrane, cell	Lecture	CO1 CO2	Mid Term-1, Quiz & End Sem Exam





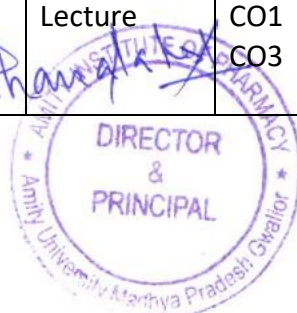
	division, cell junctions.			
11	Structure and functions of cell, transport across cell membrane, cell division, cell junctions.	Lecture	CO1 CO2	Mid Term-1, Quiz & End Sem Exam
12	Revision---- Structure and functions of cell, transport across cell membrane, cell division, cell junctions.	Tutorial		Mid Term-1, Quiz & End Sem Exam
13	General principles of cell communication , intracellular signaling pathway activation by extracellular signal molecule, Forms of intracellular signaling: a) Contact-dependent b) Paracrine c) Synaptic d) Endocrine	Lecture	CO1 CO2	Mid Term-1, Quiz & End Sem Exam
14	General principles of cell communication, intracellular signaling pathway activation by extracellular signal molecule,	Lecture	CO1 CO2	Mid Term-1, Quiz & End Sem Exam



15	Forms of intracellular signaling: a) Contact-dependent b) Paracrine c) Synaptic d) Endocrine	Lecture	CO1 CO2	Mid Term-1, Quiz & End Sem Exam
16	Unit test	Tutorial		Mid Term-1, Quiz & End Sem Exam
17	Classification of tissues, structure, location and functions of epithelial	Lecture	CO1 CO3	Mid Term-1, Quiz & End Sem Exam
18	Classification of tissues, structure, location and functions of epithelial	Lecture	CO1 CO3	Mid Term-1, Quiz & End Sem Exam
19	Classification of tissues, structure, location and functions of muscular and nervous.	Lecture	CO1 CO3	Mid Term-1, Quiz & End Sem Exam
20	Classification of tissues, structure, location and functions of connective tissues.	Tutorial	CO1 CO3	Mid Term-1, Quiz & End Sem Exam
21	Structure and functions of skin	Lecture	Unit-2 CO3	Mid Term-1, Quiz & End Sem Exam



22	Divisions of skeletal system, types of bone	Lecture	CO1 CO3	Mid Term-1, Quiz & End Sem Exam
23	Divisions of skeletal system, types of bone	Lecture	CO1 CO3	Mid Term-1, Quiz & End Sem Exam
24	Quiz	Tutorial		Mid Term-1, Quiz & End Sem Exam
25	salient features and functions of bones of axial and appendicular skeletal system	Lecture	CO1 CO3	Mid Term-1, Quiz & End Sem Exam
26	Salient features and functions of bones of axial and appendicular skeletal system	Lecture	CO1 CO3	Mid Term-1, Quiz & End Sem Exam
27	Organization of skeletal muscle, physiology of muscle contraction	Lecture	CO1 CO3	Mid Term-1, Quiz & End Sem Exam
28	Revision of Bones	Tutorial		Mid Term-1, Quiz & End Sem Exam
29	Neuromuscular junction	Lecture	CO1	Mid Term-1, Quiz & End Sem Exam
30	Structural and functional classification,	Lecture	CO1 CO3	Mid Term-1, Quiz &



	types of joints movements and its articulation			End Sem Exam
31	Structural and functional classification, types of joints movements and its articulation	Lecture	CO1 CO3	Mid Term-1, Quiz & End Sem Exam
32	Body fluids, composition and functions of blood	Tutorial	Unit-3 CO4	Mid Term-2, Quiz & End Sem Exam
33	Hemopoiesis, formation of hemoglobin, anemia,	Lecture	CO1 CO4	Mid Term-2, Quiz & End Sem Exam
34	Mechanisms of coagulation	Lecture	CO1 CO4	Mid Term-2, Quiz & End Sem Exam
35	Blood grouping, Rh factors	Lecture	CO1 CO4	Mid Term-2, Quiz & End Sem Exam
36	Seminar	Tutorial		Mid Term-2, Quiz & End Sem Exam
37	Transfusion, its significance and disorders of blood	Lecture	CO1 CO4	Mid Term-2, Quiz & End Sem Exam
38	Reticulo endothelial system	Lecture	CO1 CO4	Mid Term-2, Quiz & End Sem Exam



39	Lymphatic organs and tissues, lymphatic vessels, lymph circulation and functions of lymphatic system	Lecture	CO1 CO4	Mid Term-2, Quiz & End Sem Exam
40	Unit test	Tutorial		Mid Term-2, Quiz & End Sem Exam
41	Classification of peripheral nervous	Lecture	Unit-4	Mid Term-2, Quiz & End Sem Exam
42	Structure and functions of sympathetic and parasympathetic nervous system	Lecture	CO1 CO4	Mid Term-2, Quiz & End Sem Exam
43	Origin and functions of spinal and cranial nerves	Lecture	CO1	Mid Term-2, Quiz & End Sem Exam
44	Seminar	Tutorial		Mid Term-2, Quiz & End Sem Exam
45	Structure and functions of eye its their disorders.	Lecture	CO1 CO4	Mid Term-2, Quiz & End Sem Exam
46	Structure and functions of ear its disorders.	Lecture	CO1 CO4	Mid Term-2, Quiz & End Sem Exam



47	Structure and functions of tongue and its disorders.	Lecture	CO1	Quiz & End Sem Exam
48	Quiz	Tutorial		Quiz & End Sem Exam
49	Heart – anatomy	Lecture	Unit-5	Quiz & End Sem Exam
50	Heart blood circulation	Lecture	CO1 CO5	Quiz & End Sem Exam
51	Blood vessels, structure and functions of artery, vein and capillaries	Lecture	CO1 CO5	Quiz & End Sem Exam
52	Blood vessels, structure and functions of artery, vein and capillaries	Tutorial	CO1 CO5	Quiz & End Sem Exam
53	elements of conduction system of heart and heart beat	Lecture	CO1 CO5	Quiz & End Sem Exam
54	Elements of conduction system of heart and heart beat	Lecture	CO1 CO5	Quiz & End Sem Exam
55	Regulation by autonomic nervous system, cardiac output	Lecture	CO1 CO5	Quiz & End Sem Exam
56	Unit test	Tutorial		Quiz & End Sem Exam
57	Cardiac cycle	Lecture	CO1 CO5	Quiz & End Sem Exam



58	Regulation of blood pressure, pulse, electrocardiogram and disorders of heart.	Lecture	CO1 CO5	Quiz & End Sem Exam
59	Regulation of blood pressure, pulse, electrocardiogram and disorders of heart.	Lecture	CO1 CO5	Quiz & End Sem Exam
60	Unit test	Tutorial		Quiz & End Sem Exam

**G. Course Articulation Matrix (Mapping of COs with POs)**

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P O 1	P O 2	P O 3
<b>BP101T .1</b>	Explain the gross morphology, structure and functions of various organs of the human body.	3	-	-	-	2	2	1	-	-	-	-	-	3	2	1
<b>BP101T .2.</b>	Describe the various process of cell communication and homeostatic mechanisms and their imbalances.	3	-	-	1	-	2	-	-	-	-	3	2	3	1	

*A. Hirani*  


<b>BP101T</b> <b>.3.</b>	Identify the various tissues and organs of different systems of human body and give the protection to human body as integument, support as skeleton system.	3	2	-	3	-	2	-	-	-	-	3			1	2	3
<b>BP101T</b> <b>.4.</b>	Perform the various experiments related to special senses and nervous system.	2	2	3	3	-	1	-	-	-	-	3			2	3	2
<b>BP101T</b> <b>.5.</b>	Appreciate coordinated working pattern of some vital organs of specific system.	3	-	2	-	2	-	-	-	-	-	3			2	3	3

**Sample Question Paper**

Amity Institute of Pharmacy Department of Pharmacology I MID-SEMESTER (SEM –I <sup>st</sup> ) 2023-24						
Class: B.Pharm, I Semester						
Subject Name: BP101T Human Anatomy and Physiology-I Theory	Time: 1 Hrs			Max. Marks: 30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,2,4,10	Q.8,9,6	Q.5,3	Q.7		
Student will be able to						

  
**DIRECTOR & PRINCIPAL**  
 Amity Institute of Pharmacy  
 Amity University, Madhya Pradesh, India



**CO1.** Explain the gross morphology, structure and functions of various organs of the human body.  
**CO2.** Describe the various process of cell communication and homeostatic mechanisms and their imbalances.  
**CO3.** Identify the various tissues and organs of different systems of human body and give the protection to human body as integument, support as skeleton system.

CO Map	Question No.	Question	Marks
CO1	Q.1	Define homeostasis with examples.	2
CO1	Q.2	Define endocytosis, phagocytosis, and pinocytosis with example.	2
CO1	Q.3	Write any of the two important functions of the epithelial tissue.	2
CO1 CO2	Q.4	Define the terms superior, inferior, medial, lateral, and distal.	2
CO1 CO2	Q.5	Explain endocrine signaling.	2
CO1	Q.6	How transport across cell membrane occurs explain in detail	10
CO1 CO2	Q.7	What are different types of receptors and explain their intracellular signaling.	10
CO1	Q.8	Explain the structure and functions of a cell.	5
CO1	Q.9	Discuss basic life processes	5
CO2	Q.10	Explain the structure and functions of skin.	5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**No Attainment Level:**

40.4 % Percentage of students secured more than 60% marks, so this course HAP-I-THEORY (BP101T) not attained any Level.





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AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

#### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### Programme Outcomes:

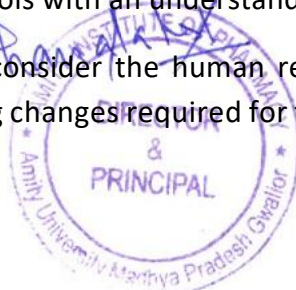
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**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “- “



**PROGRAMME ARTICULATION  
MATRIX**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
I SEM																	
	BP103T		3	2	2	1	3	2	1	1	3	2					
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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DIRECTOR  
&  
PRINCIPAL



## DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

### Course Handout

Course : Medicinal Chemistry I – THEORY

Course Code : BP402T, Crédits : 04, Session :2023-24 (Odd Sem.), Class : B.Pharm. 1st Year

Faculty Name: Dr. Sathish K. Mittapalli

- A. Introduction:** The course is designed to impart fundamental knowledge on the preparatory pharmacy with arts and science of preparing the different conventional dosage forms.
- B. Course Outcomes:** At the end of the course, students will be able to:
- BP402T.1.** understand the chemistry of drugs with respect to their pharmacological activity
  - BP402T.2.** *understand the drug metabolic pathways, adverse effect and therapeutic value of drugs*
  - BP402T.3.** know the Structural Activity Relationship (SAR) of different class of drugs
  - BP402T.4.** develop analytical skills.
  - BP402T.5.** write the chemical synthesis of some drugs.
- C. Programme Outcomes:**
- [PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
- [PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
- [PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
- [PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
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**D. Assessment Plan:**

<b>Component of Evaluation</b>	<b>Description</b>	<b>Code</b>	<b>Weightage %</b>
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	3%
	Student – Teacher interaction	S-T I	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

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## E. Syllabus

### UNIT – I

Introduction to Medicinal Chemistry

History and development of medicinal chemistry Physicochemical properties in relation to biological action Ionization, Solubility, Partition Coefficient, Hydrogen bonding, Protein binding, Chelation, Bioisosterism, Optical and Geometrical isomerism, **Drug metabolism** Drug metabolism principles- Phase I and Phase II. Factors affecting drug metabolism including stereo chemical aspects

### UNIT – II

#### Drugs acting on Autonomic Nervous System

##### Adrenergic Neurotransmitters:

Biosynthesis and catabolism of catecholamine. Adrenergic receptors (Alpha & Beta) and their distribution.

**Sympathomimetic agents: SAR of Sympathomimetic agents** Direct acting: Nor-epinephrine, Epinephrine, Phenylephrine\*, Dopamine, Methyl dopa, Clonidine, Dobutamine, Isoproterenol, Terbutaline, Salbutamol\*, Bitolterol, Naphazoline, Oxymetazoline and Xylometazoline.

- Indirect acting agents: Hydroxyamphetamine, Pseudoephedrine, Propylhexedrine.
- Agents with mixed mechanism: Ephedrine, Metaraminol.

##### Adrenergic Antagonists:

**Alpha adrenergic blockers:** Tolazoline\*, Phentolamine, Phenoxybenzamine, Prazosin, Dihydroergotamine, Methysergide.

**Beta adrenergic blockers:** SAR of beta blockers, Propranolol\*, Metibranolol, Atenolol, Betazolol, Bisoprolol, Esmolol, Metoprolol, Labetolol, Carvedilol.

### UNIT – III

#### Cholinergic neurotransmitters:

Biosynthesis and catabolism of acetylcholine.

Cholinergic receptors (Muscarinic & Nicotinic) and their distribution.

**Parasympathomimetic agents: SAR of Parasympathomimetic agents** Direct acting agents: Acetylcholine, Carbachol\*, Bethanechol, Methacholine, Pilocarpine.

#### Indirect acting/ Cholinesterase inhibitors (Reversible & Irreversible):

Physostigmine, Neostigmine\*, Pyridostigmine, Edrophonium chloride, Tacrine hydrochloride, Ambenonium chloride, Isoflurophate, Echothiophate iodide, Parathione.

#### Cholinergic Blocking agents: SAR of cholinolytic agents

**Solanaceous alkaloids and analogues:** Atropine sulphate, Hyoscyamine sulphate, Scopolamine hydrobromide, Homatropine hydrobromide, Ipratropium bromide\*.

**Synthetic cholinergic blocking agents:** Tropicamide, Cyclopentolate hydrochloride, Clidinium bromide, Dicyclomine hydrochloride\*, Glycopyrrolate, Methantheline bromide, Propantheline bromide, Benztropine mesylate, Orphenadrine citrate, Biperidine hydrochloride, Procyclidine hydrochloride\*, Tridihexethyl chloride, Isopropamide iodide, Ethopropazine hydrochloride

### UNIT – IV

#### A. Sedatives and Hypnotics:

Benzodiazepines: SAR of Benzodiazepines, Chlordiazepoxide, Diazepam\*, Oxazepam, Chlorazepate, Lorazepam, Alprazolam, Zolpidem Barbiturates: SAR of barbiturates, Barbitol\*, Phenobarbital, Mephobarbital, Amobarbital, Butobarbital, Pentobarbital, Secobarbital

Miscellaneous:

Amides & imides: Glutethimide.

Alcohol & their carbamate derivatives: Meprobamate, Ethchlorvynol. Aldehyde & their derivatives: Triclofos sodium, Paraldehyde.

B. Antipsychotics



Phenothiazines: SAR of Phenothiazines - Promazine hydrochloride, Chlorpromazine hydrochloride\*, Triflupromazine, Thioridazine hydrochloride, Piperacetazine hydrochloride, Prochlorperazine maleate, Trifluoperazine hydrochloride.

Ring Analogues of Phenothiazines: Chlorprothixene, Thiothixene, Loxapine succinate, Clozapine.

#### UNIV – V

A. General anesthetics:

B. Inhalation anesthetics: Halothane\*, Methoxyflurane, Enflurane, Sevoflurane, Isoflurane, Desflurane.

C. Ultra short acting barbiturates: Methohexital sodium\*, Thiopental sodium.

D. Dissociative anesthetics: Ketamine hydrochloride.\*

E. Narcotic and non-narcotic analgesics

F. Morphine and related drugs: SAR of Morphine analogues, Morphine sulphate, Codeine, Meperidine hydrochloride, Anileridine hydrochloride, Diphenoxylate hydrochloride, Loperamide hydrochloride, Fentanyl citrate\*, Methadone hydrochloride\*, Propoxyphene hydrochloride, Pentazocine, Levorphanol tartarate.

G. Narcotic antagonists: Nalorphine hydrochloride, Levallorphan tartarate, Naloxone hydrochloride.

H. Anti-inflammatory agents: Sodium salicylate, Aspirin, Mefenamic acid\*, Meclofenamate, Indomethacin, Sulindac, Tolmetin, Zomepirac, Diclofenac, Ketorolac, Ibuprofen\*, Naproxen, Piroxicam, Phenacetin, Acetaminophen, Antipyrine, Phenylbutazon

#### Examination Scheme:

Components	A	CT	S/V/Q/HA	STI	EE
Weightage (%)	4	15	3	3	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination; A: Attendance

#### I. Suggested Text/Reference Books:

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
2. Foye's Principles of Medicinal Chemistry.
3. Burger's Medicinal Chemistry, Vol I to IV.
4. Introduction to principles of drug design- Smith and Williams.
5. Remington's Pharmaceutical Sciences.
6. Martindale's extra pharmacopoeia.

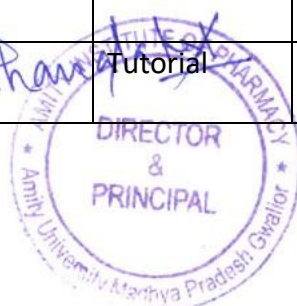
#### Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Cholinergic neurotransmitters	Lecture	1,5	Mid Term-1, Quiz & End Sem Exam
2	Ring Analogues of Phenothiazines	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
3	Inhalation anesthetics	Lecture	1	Mid Term-1, Quiz & End Sem Exam
4	<i>Synthetic cholinergic blocking agents</i>	Tutorial	1	Mid Term-1, Quiz & End Sem Exam
5	Introduction to Medicinal Chemistry	Lecture	2	Mid Term-1, Quiz & End Sem Exam
6	<b>C Drug metabolism</b> Drug metabolism principles- Phase I and Phase II.	Lecture	1, 2	Mid Term-1, Quiz & End Sem Exam

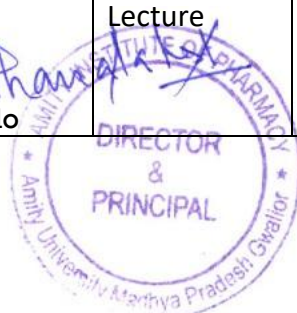




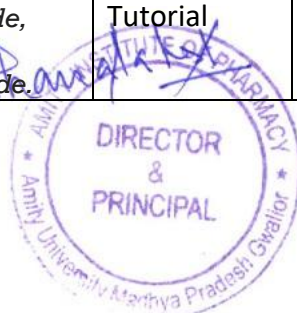
7	Benzodiazepines: SAR of Benzodiazepines	Lecture	2	Mid Term-1, Quiz & End Sem Exam
8	Factors affecting drug metabolism including stereo chemical aspects.	Tutorial	3	Mid Term-1, Quiz & End Sem Exam
9	D)Computation of analytical results, significant figures,	Lecture	3,4	Mid Term-1, Quiz & End Sem Exam
10	<b>Adrenergic Neurotransmitters:</b> Biosynthesis and catabolism of catecholamine.	Lecture	4	Mid Term-1, Quiz & End Sem Exam
11	Adrenergic receptors (Alpha & Beta) and their distribution.	Lecture	2, 5	Mid Term-1, Quiz & End Sem Exam
12	Sympathomimetic agents: SAR of Sympathomimetic agents	Tutorial	4	Mid Term-1, Quiz & End Sem Exam
13	B Direct acting: Nor-epinephrine, Epinephrine, Phenylephrine*, Dopamine	Lecture	5	Mid Term-1, Quiz & End Sem Exam
14	Direct acting: Nor-epinephrine, Epinephrine, Phenylephrine*, Dopamine	Lecture	5	Mid Term-1, Quiz & End Sem Exam
15	Methyldopa, Clonidine, Dobutamine,	Lecture	1,5	Mid Term-1, Quiz & End Sem Exam
16	Isoproterenol, Terbutaline, Salbutamol*, Bitolterol, Naphazoline,	Tutorial	4	Mid Term-1, Quiz & End Sem Exam
17	Oxymetazoline and Xylometazoline	Lecture	5	Mid Term-1, Quiz & End Sem Exam
18	A)Potentiometry: introduction	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
19	electrochemical cells, half cells, electrode , measurement of potential	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
20	Indirect acting agents: Hydroxyamphetamine, Pseudoephedrine, Propylhexedrine.	Tutorial	3	Mid Term-1, Quiz & End Sem Exam
21	Agents with mixed mechanism: Ephedrine, Metaraminol.	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
22	Alpha adrenergic blockers: Tolazoline*,	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
23	Phentolamine, □Phenoxybenzamine, Prazosin, Dihydroergotamine, Methysergide	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
24	Quiz	Tutorial		Mid Term-1, Quiz & End Sem Exam



25	Cholinergic neurotransmitters: Biosynthesis and catabolism of acetylcholine.	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
26	Cholinergic receptors (Muscarinic & Nicotinic)	Lecture	Unit-3	Mid Term-1, Quiz & End Sem Exam
27	A Parasympathomimetic agents:	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
28	preparation, procedure, methods of detection	Tutorial	2	Mid Term-1, Quiz & End Sem Exam
29	B SAR of Parasympathomimetic agents	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
30	Direct acting agents: Acetylcholine, Carbachol*, Bethanechol, Methacholine,	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
31	C) Paper chromatography : theory of partition, different techniques employed filter papers,	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
32	Indirect acting/ Cholinesterase inhibitors (Reversible & Irreversible):	Tutorial	2	Mid Term-2, Quiz & End Sem Exam
33	Physostigmine, Neostigmine*, Pyridostigmine,	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
34	Edrophonium chloride, Tacrine hydrochlorid	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
35	Cholinergic Blocking agents: SAR of cholinolytic agents	Lecture	4	Mid Term-2, Quiz & End Sem Exam
36	Seminar	Tutorial		Mid Term-2, Quiz & End Sem Exam
37	Solanaceous alkaloids and analogues: Atropine sulphate	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
38	, Hyoscyamine sulphate, Scopolamine hydrobromide, Homatropine	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
39	hydrobromide, Ipratropium bromide*	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
40	Unit test	Tutorial		Mid Term-2, Quiz & End Sem Exam
41	A) Synthetic cholinergic blocking agents: Tropicamide, Cyclopentolate hydrochloride	Lecture	4	Mid Term-2, Quiz & End Sem Exam



	ride, Clidinium bromide,			
42	study & working principles of instrumentation	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
43	Dicyclomine hydrochloride*, Glycopyrrolate, Methantheline bromide,	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
44	Seminar	Tutorial		Mid Term-2, Quiz & End Sem Exam
45	Propantheline bromide, Benzotropine mesylate,	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
46	Orphenadrine citrate, Biperidine hydrochloride, Procyclidine hydrochloride*	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
47	applications	Lecture	2,3	Quiz & End Sem Exam
48	Quiz	Tutorial		Quiz & End Sem Exam
49	<i>sedatives and Hypnotics: Benzodiazepines: SAR of Benzodiazepines, Chlordiazepoxide,</i>	Lecture	2,3	Quiz & End Sem Exam
50	<i>Diazepam*, Oxazepam, Chlorazepate, Lorazepam, Alprazolam</i>	Lecture	2,3	Quiz & End Sem Exam
51	<i>applications</i>	Lecture	2,3	Quiz & End Sem Exam
52	<i>, Zolpidem Barbiturates: SAR of barbiturates, Barbitol*, Phenobarbital,</i>	Tutorial	2	Quiz & End Sem Exam
53	<i>Mephobarbital, Amobarbital, Butobarbital</i>	Lecture	2,3	Quiz & End Sem Exam
54	<i>Pentobarbital, Secobarbital</i>	Lecture	2,3	Quiz & End Sem Exam
55	<i>AB. Antipsychotics Phenothiazines: SAR of Phenothiazines -</i>	Lecture	2,3	Quiz & End Sem Exam
56	<i>study &amp; working principles of instrumentation</i>	Tutorial	2	Quiz & End Sem Exam
57	<i>applications</i>	Lecture	2,3	Quiz & End Sem Exam
58	<i>Promazine hydrochloride, Chlorpromazine hydrochloride*, Trifluoperazine, Thioridazine hydrochloride,</i>	Lecture	2,3	Quiz & End Sem Exam
59	<i>Piperacetazine hydrochloride, Prochlorperazine maleate, Trifluoperazine hydrochloride.</i>	Lecture	2,3	Quiz & End Sem Exam
60	<i>Piperacetazine hydrochloride, Prochlorperazine maleate, Trifluoperazine hydrochloride.</i>	Tutorial	1,5	Quiz & End Sem Exam



61	<i>C. Anticonvulsants: SAR of Anticonvulsants, mechanism of anticonvulsant action Barbiturates: Phenobarbitone, Methabarbital.</i>		2	
62	<i>Hydantoins: □Phenytoin*, Mephenytoin, Ethotoin Oxazolidine diones: □Trimethadione, Paramethadione Succinimides: □Phensuximide, Methsuximide, Ethosuximide* Urea and □monoacylureas: Phenacemide, Carbamazepine</i>		2	

### J. Course Articulation Matrix (Mapping of COs with POs)

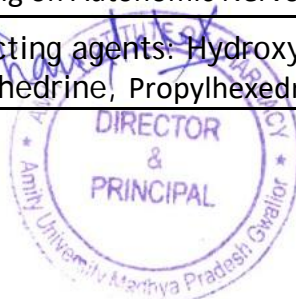
CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
<b>BP402T.1</b>	<b>BP103T.1.</b> understand the chemistry of drugs with respect to their pharmacological activity	3	-	-	-	2	2	1	-	1	-	-				
<b>BP402T.2.</b>	<b>BP103T.2.</b> understand the drug metabolic pathways, adverse effect and therapeutic value of drugs	3	-	-	1	-	2	-	-	-	-	3				
<b>BP402T.3.</b>	<b>BP103T.3.</b> know the Structural Activity Relationship (SAR) of different class of drugs	3	2	-	3	-	2	-	-	-	-	3				



<b>BP402T.4.</b>	<b>BP103T.4.</b> Able to emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs.	2	2	3	3	-	1	-	-	-	-	3				
<b>BP402T.5.</b>	<b>BP103T.5.</b> Emphasizes on chemical synthesis of important drugs under each class.	1	-	3	-	-	-	-	-	-	-	3				

### Sample Question Paper

Amity Institute of Pharmacy Department of <b>PHARMACEUTICAL CHEMISTRY</b> I MID-SEMESTER (SEM –IV ) 2023-24						
Class: B.Pharm, I Semester						
Subject Name: BP103T Pharmaceutics-I Theory		Time: 1 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,3,4,5	Q.6,8,9	Q.2	Q.7, 10		
The student will be able to <b>CO1.</b> understand the chemistry of drugs with respect to their pharmacological activity <b>CO2.</b> Understand the principles of volumetric and electro chemical analysis. <b>CO3</b> understand the drug metabolic pathways, adverse effect and therapeutic value of drug <b>CO4.</b> develop analytical skills. <b>CO5.</b> Solve the dose calculation, pharmaceutical calculations.						
CO Map	Question No.	Question				Marks
CO4	Q.1	Concept of Drug metabolism				2
CO5	Q.2	Different techniques of analysis				2
CO1	Q.3	Primary and secondary standards?				2
CO2	Q.4	Drugs acting on Autonomic Nervous System				2
CO2	Q.5	Indirect acting agents: Hydroxyamphetamine, Pseudoephedrine, Propylhexedrine.				2



CO1	Q.6	Summarize the different career options available in pharmaceutical industry.	10
CO4	Q.7	Sympathomimetic agents: SAR of Sympathomimetic agents	10
CO3	Q.8	Theories to know the Structural Activity Relationship (SAR) of different class of drugs	5
CO2	Q.9	physicochemical properties and metabolism of drugs.	5
CO4	Q.10	Drugs acting on Central Nervous System	5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**No Attainment Level:**

54.3 % Percentage of students secured more than 60% marks, so this course PHARMACEUTICAL ANALYSIS- I – THEORY (BP103T) not attained any Level.



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# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICS

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

#### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### Programme Outcomes:

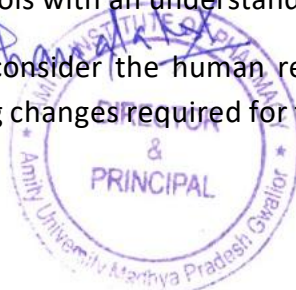
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**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

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societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

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**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “-”



**PROGRAMME ARTICULATION MATRIX**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
I SEM	BP103T	3	-	2	-	1	3	2	1	1	-	2	2	1	-

*S. H. Hanumanth*

  
AMITY INSTITUTE OF PHARMACY  
DIRECTOR & PRINCIPAL  
Amity University, Madhya Pradesh, Gwalior



## DEPARTMENT OF PHARMACEUTICS

### Course Handout

Course : PHARMACEUTICS – I THEORY

Course Code : BP103T, Crédits : 04, Session :2023-24 (Odd Sem.), Class : B.Pharm. 1st Year

Faculty Name: Dr. Jovita Kanoujia

- A. Introduction:** The course is designed to impart fundamental knowledge on the preparatory pharmacy with arts and science of preparing the different conventional dosage forms.
- B. Course Outcomes:** At the end of the course, students will be able to:
- BP103T.1.** Relate pharmacy education, and pharmacy history with pharmacy career options.
  - BP103T.2.** Classify the different types of dosage forms based on uses, physical form, and pharmaceutical incompatibilities.
  - BP103T.3.** Experiment in the development of various conventional dosage forms such as solid, liquid, and semisolid dosage forms.
  - BP103T.4.** Able to analyze the prescription, stability issues in emulsion and suspension.
  - BP103T.5.** Solve the dose calculation, pharmaceutical calculations.
- C. Programme Outcomes:**
- [PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
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	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	3%
	Student – Teacher interaction	S-T I	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

*[Handwritten Signature]*  


## E. Syllabus

### UNIT – I

**Historical background and development of profession of pharmacy:** History of profession of Pharmacy in India in relation to pharmacy education, industry and organization, Pharmacy as a career, Pharmacopoeias: Introduction to IP, BP, USP and Extra Pharmacopoeia. **Dosage forms:** Introduction to dosage forms, classification and definitions, **Prescription:** Definition, Parts of prescription, handling of Prescription and Errors in prescription. **Posology:** Definition, Factors affecting posology. Pediatric dose calculations based on age, body weight and body surface area.

### UNIT – II

**Pharmaceutical calculations:** Weights and measures – Imperial & Metric system, Calculations involving percentage solutions, alligation, proof spirit and isotonic solutions based on freezing point and molecular weight. **Powders:** Definition, classification, advantages and disadvantages, Simple & compound powders – official preparations, dusting powders, effervescent, efflorescent and hygroscopic powders, eutectic mixtures. Geometric dilutions. **Liquid dosage forms:** Advantages and disadvantages of liquid dosage forms. Excipients used in formulation of liquid dosage forms. Solubility enhancement techniques.

### UNIT – III

**Monophasic liquids:** Definitions and preparations of Gargles, Mouthwashes, Throat Paint, Eardrops, Nasal drops, Enemas, Syrups, Elixirs, Liniments and Lotions. **Biphasic liquids: Suspensions:** Definition, advantages and disadvantages, classifications, Preparation of suspensions; Flocculated and Deflocculated suspension & stability problems and methods to overcome. **Emulsions:** Definition, classification, emulsifying agent, test for the identification of type of Emulsion, Methods of preparation & stability problems and methods to overcome.

### UNIT – IV

**Suppositories:** Definition, types, advantages and disadvantages, types of bases, methods of preparations. Displacement value & its calculations, evaluation of suppositories. **Pharmaceutical incompatibilities:** Definition, classification, physical, chemical and therapeutic incompatibilities with examples.

### UNIT – V

**Semisolid dosage forms:** Definitions, classification, mechanisms and factors influencing dermal penetration of drugs. Preparation of ointments, pastes, creams and gels. Excipients used in semi solid dosage forms. Evaluation of semi solid dosages forms

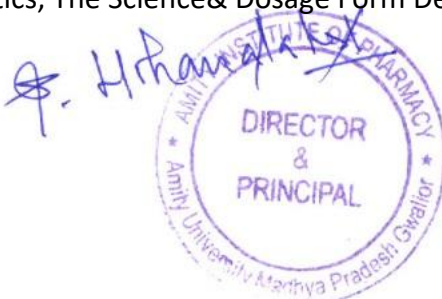
## F. Examination Scheme:

Components	A	CT	S/V/Q/HA	STI	EE
Weightage (%)	4	15	3	3	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination; A: Attendance

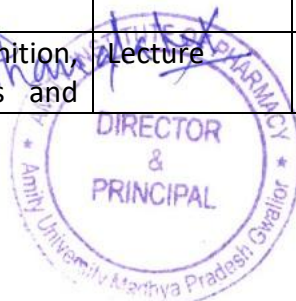
## G. Suggested Text/Reference Books:

- H.C. Ansel et al., Pharmaceutical Dosage Form and Drug Delivery System, Lippincott Williams and Walkins, New Delhi.
- Carter S.J., Cooper and Gunn's-Dispensing for Pharmaceutical Students, CBS publishers, New Delhi.
- M.E. Aulton, Pharmaceutics, The Science & Dosage Form Design, Churchill Livingstone, Edinburgh.
- Indian pharmacopoeia.
- British pharmacopoeia.

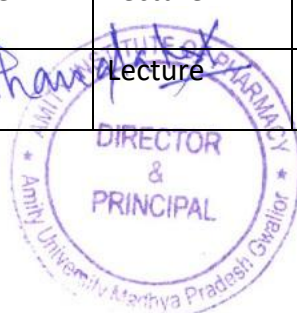


## H. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	History of profession of Pharmacy in India in relation to pharmacy education	Lecture	1	Mid Term-1, Quiz & End Sem Exam
2	History of profession of Pharmacy in India in relation to pharmacy industry and organization	Lecture	1	Mid Term-1, Quiz & End Sem Exam
3	Pharmacy as a career	Lecture		Mid Term-1, Quiz & End Sem Exam
4	Revision of history of pharmacy	Tutorial	1	Mid Term-1, Quiz & End Sem Exam
5	Introduction to dosage forms	Lecture	2	Mid Term-1, Quiz & End Sem Exam
6	classification and definitions	Lecture	2	Mid Term-1, Quiz & End Sem Exam
7	classification and definitions	Lecture	2	Mid Term-1, Quiz & End Sem Exam
8	Quiz	Tutorial		Mid Term-1, Quiz & End Sem Exam
9	Definition, Parts of prescription,	Lecture	4	Mid Term-1, Quiz & End Sem Exam
10	Handling of Prescription and Errors in prescription.	Lecture	4	Mid Term-1, Quiz & End Sem Exam
11	Definition, Factors affecting posology.	Lecture	5	Mid Term-1, Quiz & End Sem Exam
12	Discussion about posology	Tutorial		Mid Term-1, Quiz & End Sem Exam
13	Pediatric dose calculations based on age, body weight and body surface area.	Lecture	5	Mid Term-1, Quiz & End Sem Exam
14	Weights and measures – Imperial & Metric system,	Lecture	5	Mid Term-1, Quiz & End Sem Exam
15	Calculations involving percentage solutions, alligation, proof spirit	Lecture	5	Mid Term-1, Quiz & End Sem Exam
16	Unit test	Tutorial		Mid Term-1, Quiz & End Sem Exam
17	Calculations involving isotonic solutions based on freezing point and molecular weight.	Lecture	5	Mid Term-1, Quiz & End Sem Exam
18	<b>Powders:</b> Definition, classification, advantages and	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam



	disadvantages, Simple & compound powders			
19	Official preparations, dusting powders, effervescent, efflorescent and hygroscopic powders,	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
20	Group discussion on different topics	Tutorial		Mid Term-1, Quiz & End Sem Exam
21	Eutectic mixtures. Geometric dilutions. Liquid dosage forms	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
22	Advantages and disadvantages of liquid dosage forms.	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
23	Excipients used in formulation of liquid dosage forms.	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
24	Quiz	Tutorial		Mid Term-1, Quiz & End Sem Exam
25	Solubility enhancement techniques.	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
26	Definitions and preparations of Gargles	Lecture	Unit-3	Mid Term-1, Quiz & End Sem Exam
27	Mouthwashes, Throat Paint	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
28	Revision of solubility enhancement technique	Tutorial		Mid Term-1, Quiz & End Sem Exam
29	Eardrops, Nasal drops, Enemas	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
30	Syrups, Elixirs,	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
31	Liniments and Lotions	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
32	Group discussion on liquid dosage form	Tutorial		Mid Term-2, Quiz & End Sem Exam
33	Definition, advantages and disadvantages, classifications, Preparation of suspensions	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
34	Flocculated and Deflocculated suspension	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
35	Stability problems and methods to overcome	Lecture	4	Mid Term-2, Quiz & End Sem Exam
36	Seminar	Tutorial		Mid Term-2, Quiz & End Sem Exam
37	Definition, classification, emulsifying agent	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
38	Test for identification, type of Emulsion,	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
39	Methods of preparation	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam



40	Unit test	Tutorial		Mid Term-2, Quiz & End Sem Exam
41	Stability problems and methods to overcome	Lecture	4	Mid Term-2, Quiz & End Sem Exam
42	Semisolid dosage forms: Definitions, classification	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
43	Mechanisms and factors influencing dermal penetration of drugs	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
44	Seminar	Tutorial		Mid Term-2, Quiz & End Sem Exam
45	Preparation of ointments	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
46	Preparation of paste	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
47	Preparation of cream & gel	Lecture	2,3	Quiz & End Sem Exam
48	Quiz	Tutorial		Quiz & End Sem Exam
49	Excipients used in semi solid dosage forms	Lecture	2,3	Quiz & End Sem Exam
50	Evaluation of semi solid dosages forms	Lecture	2,3	Quiz & End Sem Exam
51	Semisolid dosage forms: Definitions, classification	Lecture	2,3	Quiz & End Sem Exam
52	Group discussion on semisolid dosage form	Tutorial		Quiz & End Sem Exam
53	Mechanisms and factors influencing dermal penetration of drugs	Lecture	2,3	Quiz & End Sem Exam
54	Preparation of ointments	Lecture	2,3	Quiz & End Sem Exam
55	Preparation of paste	Lecture	2,3	Quiz & End Sem Exam
56	Unit test	Tutorial		Quiz & End Sem Exam
57	Preparation of cream & gel	Lecture	2,3	Quiz & End Sem Exam
58	Excipients used in semi solid dosage forms	Lecture	2,3	Quiz & End Sem Exam
59	Evaluation of semi solid dosages forms	Lecture	2,3	Quiz & End Sem Exam
60	Unit test	Tutorial		Quiz & End Sem Exam

*A. H. H. H.*  
 AMITY UNIVERSITY PHARMACY  
 DIRECTOR & PRINCIPAL  
 Amity University, Madhya Pradesh, Gwalior



**I. Course Articulation Matrix (Mapping of COs with POs)**

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3	
<b>BP103T.1</b>	<b>BP103T.1.</b> Relate pharmacy education, and pharmacy history with pharmacy career options.	3	-	-	-	2	2	1	-	1	-	-	-	-	-	-	-
<b>BP103T.2.</b>	<b>BP103T.2.</b> Classify the different types of dosage forms based on uses, physical form, and pharmaceutical incompatibilities.	3	-	-	1	-	2	-	-	-	-	3	-	3	1	-	
<b>BP103T.3.</b>	<b>BP103T.3.</b> Experiment in the development of various conventional dosage forms such as solid, liquid, and semisolid dosage forms.	3	2	-	3	-	2	-	-	-	-	3	-	3	-	-	
<b>BP103T.4.</b>	<b>BP103T.4.</b> Able to analyze the prescription, stability issues in emulsion and suspension.	2	2	3	3	-	1	-	-	-	-	3	-	1	1	-	
<b>BP103T.5.</b>	<b>BP103T.5.</b> Solve the dose calculation, pharmaceutical calculations.	1	-	3	-	-	-	-	-	-	-	3	-	1	1	-	

*A. H. H. H.*  


### Sample Question Paper

Amity Institute of Pharmacy Department of Pharmaceutics MID-SEMESTER (SEM –Ist) 2023-24						
Class: B.Pharm, I Semester						
Subject Name: BP103T Pharmaceutics-I Theory		Time: 1 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,3,4,5	Q.6,8,9	Q.2	Q.7, 10		
<p>The student will be able to</p> <p><b>CO1.</b> Relate pharmacy education, and pharmacy history with pharmacy career options.</p> <p><b>CO2.</b> Classify the different types of dosage forms based on uses, physical form, and pharmaceutical incompatibilities.</p> <p><b>CO3.</b> Experiment in the development of various conventional dosage forms such as solid, liquid, and semisolid dosage forms.</p> <p><b>CO4.</b> Able to analyze the prescription, stability issues in emulsion and suspension.</p> <p><b>CO5.</b> Solve the dose calculation, pharmaceutical calculations.</p>						
CO Map	Question No.	Question				Marks
CO4	Q.1	Enlist the types of the prescription.				2
CO5	Q.2	Apply Fried's rule to calculate the pediatric dose for a 12-year-old child. The adult dose for the same drug is 470 mg. What dose should the child be given?				2
CO1	Q.3	Who is the first pharmacy graduate in India?				2
CO2	Q.4	Define divided powder.				2
CO2	Q.5	Write the name of two liquid dosage forms.				2
CO1	Q.6	Summarize the different career options available in pharmaceutical industry.				10
CO4	Q.7	Assume the emulsion is having a problem of stability, how will you solve this issue?				10
CO3	Q.8	Compare eutectic mixtures and deliquescent powder.				5
CO2	Q.9	Illustrate the classification of different dosage forms on the basis of route of administration.				5
CO4	Q.10	How to handle the prescription?				5



Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**No Attainment Level:**

54.3 % Percentage of students secured more than 60% marks, so this course PHARMACEUTICS I – THEORY (BP103T) not attained any Level.

*H. H. H. H.*



DIRECTOR  
&  
PRINCIPAL

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**AMITY UNIVERSITY MADHYA PRADESH, GWALIOR**

**AMITY INSTITUTE OF PHARMACY**

**DEPARTMENT OF PHARMACEUTICAL CHEMISTRY**

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

#### **Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24**

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

#### **Programme Outcomes:**

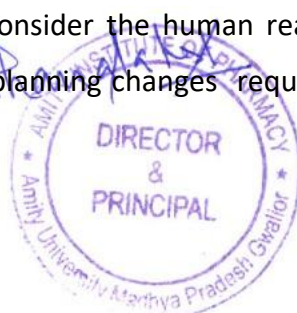
**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team -building when planning changes required for fulfilment of practice,



professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well-being.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behaviour that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

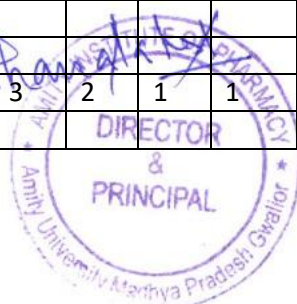
**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “-”

PROGRAMME ARTICULATION MATRIX																
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
I SEM																
	BP104T	3	-	2	1	3	2	1	1	-	2					



-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

<b>DEPARTMENT OF PHARMACEUTICAL CHEMISTRY</b>
<b>Course Handout</b>
Course : PHARMACEUTICAL INORGANIC CHEMISTRY (Theory)
Course Code : BP104T , Crédits : 04, Session :2023-24 (Odd Sem.), Class : B.Pharm. 1st Year
Faculty Name : Dr. Ram Babu Tripathi

**A. Introduction:** This course deals with the fundamentals of inorganic chemistry and monograph of inorganic drugs and pharmaceuticals. It aims to understand the preparation assay, properties and medicinal uses of inorganic compounds.

**B. Course Outcomes:** At the end of the course, students will be:

<b>CO-104.1</b>	Students will be able to understand the different sources and cause of impurities and methods to determine the presence of chloride, Arsenic, sulphate, lead and Heavy metals by limit test
<b>CO-104.2</b>	Students will be able to explain the importance of electrolytes, buffers, and dental products in the field of pharmacy.
<b>CO-104.3</b>	Students will be able to compare acidified, antacids, cathartics, and explain the mechanisms and preparation of antimicrobial agents H <sub>2</sub> O <sub>2</sub> and Iodin
<b>CO-104.4</b>	Students will be able to gain knowledge of inorganic hematinic, expectorants, antidots, and astringents and preparation of Copper sulphate, Ammonium chloride, Ferrous sulphate
<b>CO-104.5</b>	Students will be able to utilize the importance of radioactivity, radioactivity measurement and properties of different types of radiations with pharmaceutical applications.





### C. Programme Outcomes:

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

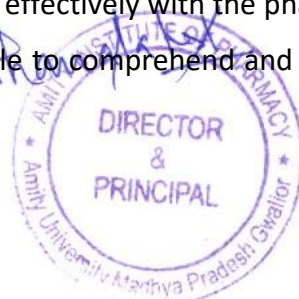
**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team -building when planning changes required for fulfilment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well- being.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behaviour that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports,



make effective presentations and documentation, and give and receive clear instructions.

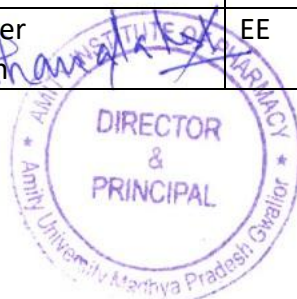
**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self- assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis

**D. Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2 quiz, assignment, open book test, field work, group discussion and seminar)		
	Seminar/ Assignment/Quiz/ Open book test	S/As/Q/OBT	3%
Interaction	Student-Teacher interaction	ST	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester	End Semester Examination	EE	75%



Examination			
<b>Total</b>			<b>100%</b>

## E. Syllabus

### UNIT I

- **Impurities in pharmaceutical substances:** History of Pharmacopoeia, Sources and types of impurities, principle involved in the limit test for Chloride, Sulphate, Iron, Arsenic, Lead and Heavy metals, modified limit test for Chloride and Sulphate
- **General methods of preparation,** assay for the compounds superscripted with **asterisk (\*)**, properties and medicinal uses of inorganic compounds belonging to the following classes

### UNIT II

- **Acids, Bases and Buffers:** Buffer equations and buffer capacity in general, buffers in pharmaceutical systems, preparation, stability, buffered isotonic solutions, measurements of tonicity, calculations and methods of adjusting isotonicity.
- **Major extra and intracellular electrolytes:** Functions of major physiological ions, Electrolytes used in the replacement therapy: Sodium chloride\*, Potassium chloride, Calcium gluconate\* and Oral Rehydration Salt (ORS), Physiological acid base balance.
- **Dental products:** Dentifrices, role of fluoride in the treatment of dental caries, Desensitizing agents, Calcium carbonate, Sodium fluoride, and Zinc eugenol cement.

### UNIT III

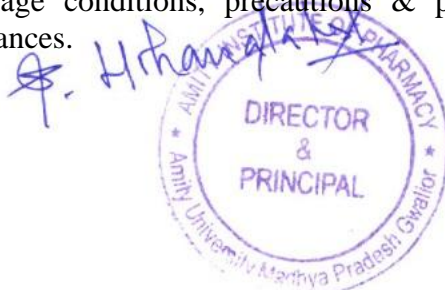
- **Gastrointestinal agents**  
**Acidifiers:** Ammonium chloride\* and Dil. HCl  
**Antacid:** Ideal properties of antacids, combinations of antacids, Sodium Bicarbonate\*, Aluminum hydroxide gel, Magnesium hydroxide mixture  
**Cathartics:** Magnesium sulphate, Sodium orthophosphate, Kaolin and Bentonite  
**Antimicrobials:** Mechanism, classification, Potassium permanganate, Boric acid, Hydrogen peroxide\*, Chlorinated lime\*, Iodine and its preparations

### UNIT IV

- **Miscellaneous compounds**  
**Expectorants:** Potassium iodide, Ammonium chloride\*.  
**Emetics:** Copper sulphate\*, Sodium potassium tartarate  
**Haematinics:** Ferrous sulphate\*, Ferrous gluconate  
**Poison and Antidote:** Sodium thiosulphate\*, Activated charcoal, Sodium nitrite  
**Astringents:** Zinc Sulphate, Potash Alum

### UNIT V

- **Radiopharmaceuticals:** Radio activity, Measurement of radioactivity, Properties of  $\alpha$ ,  $\beta$ ,  $\gamma$  radiations, Half-life, radio isotopes and study of radio isotopes - Sodium iodide  $I^{131}$ , Storage conditions, precautions & pharmaceutical application of radioactive substances.



**F. Examination Scheme:**

Components	A	ST	CT	S/As/Q/OBT	EE
Weightage (%)	4	3	15	3	75

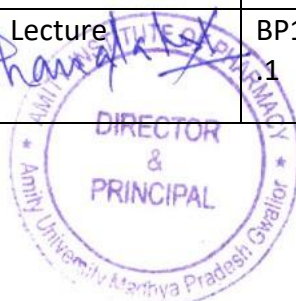
CT: Class Test, As: Assignment, ST: Student teacher interaction, S/A/Q/OBT: Seminar/ Assignment/Quiz/ Open book test, EE: End Semester Examination; A: Attendance

**G. Suggested Text/Reference Books:**

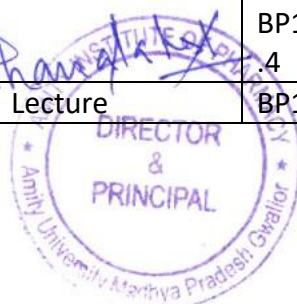
1. E A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London, 4<sup>th</sup> edition
2. A.I. Vogel, Text Book of Quantitative Inorganic analysis
3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry, 3<sup>rd</sup> Edition
4. M.L Schroff, Inorganic Pharmaceutical Chemistry
5. Bentley and Driver's Textbook of Pharmaceutical Chemistry
6. Anand & Chatwal, Inorganic Pharmaceutical Chemistry
7. Indian Pharmacopoeia

**H. Lecture Plan**

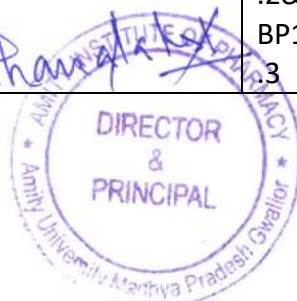
Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	History of Pharmacopoeia	Lecture	BP104T .1 & BP104T .2	Mid Term-1, Quiz & End Sem Exam
2	Sources and types of impurities	Lecture	BP104T .1	Mid Term-1, Quiz & End Sem Exam
3	Principle involved in the limit test for Chloride,	Lecture	BP104T .1	Mid Term-1, Quiz & End Sem Exam
4	Tutorial class History of Pharmacopoeia	Lecture	BP104T .1	Mid Term-1, Assignment ,Quiz & End Sem Exam
5	Principle involved in the limit test for Sulphate	Lecture	BP104T .1	Mid Term-1, Quiz & End Sem Exam
6	Principle involved in the limit test for	Lecture	BP104T .1	Mid Term-1, Quiz & End Sem Exam



	Iron			
7	Principle involved in the limit test for Arsenic	Lecture	BP104T .1	Mid Term-1, Quiz & End Sem Exam
8	Tutorial class limit test for Arsenic	Lecture	BP104T .1	Mid Term-1, Quiz, Class test & End Sem Exam
9	Principle involved in the limit test for Lead	Lecture	BP104T .1	Mid Term-1, Quiz & End Sem Exam
10	Heavy metals	Lecture	BP104T .1	Mid Term-1, Quiz & End Sem Exam
11	Modified limit test for Chloride and Sulphate	Lecture	BP104T .1	Mid Term-1, Quiz & End Sem Exam
12	<i>Tutorial class:</i> Modified limit test for Chloride	Lecture	BP104T .1	Mid Term-1, Assignment ,Quiz & End Sem Exam
13	Buffer equations and buffer capacity in general	Lecture	BP104T .2& BP104T .4	Mid Term-1, Quiz & End Sem Exam
14	Buffers in pharmaceutical systems, preparation, stability,	Lecture	BP104T .2& BP104T .4	Mid Term-1, Quiz & End Sem Exam
15	Buffered isotonic solutions, measurements of tonicity, calculations	Lecture	BP104T .2& BP104T .4	Mid Term-1, Quiz & End Sem Exam
16	<i>Tutorial class</i> Buffered isotonic solutions	Lecture	BP104T .4	Mid Term-1, Class test, Quiz & End Sem Exam
17	Methods of adjusting isotonicity.	Lecture	BP104T .2& BP104T .4	Mid Term-1, Quiz & End Sem Exam
18	Functions of major physiological ions	Lecture	BP104T .2& BP104T .4	Mid Term-1, Quiz & End Sem Exam
19	Electrolytes	Lecture	BP104T	Mid Term-1, Quiz & End Sem



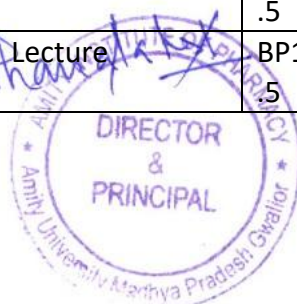
	used in the replacement therapy: Sodium chloride*, Potassium chloride, Calcium gluconate		.2& BP104T .3	Exam
20	<i>Tutorial class</i> Electrolytes used in the replacement therapy	Lecture	BP104T .2& BP104T .3	Mid Term-1, Assignment ,Quiz & End Sem Exam
21	Oral Rehydration Salt (ORS), Physiological acid base balance.	Lecture	BP104T .2& BP104T .3	Mid Term-1, Quiz & End Sem Exam
22	Dentifrices, role of fluoride in the treatment of dental caries	Lecture	BP104T .2& BP104T .3	Mid Term-1, Quiz & End Sem Exam
23	Desensitizing agents	Lecture	BP104T .2& BP104T .3	Mid Term-1, Quiz & End Sem Exam
24	<i>Tutorial class</i> Desensitizing agents	Lecture	BP104T .2& BP104T .3	Mid Term-1, Quiz & End Sem Exam
25	Calcium carbonate, Sodium fluoride, and Zinc eugenol cement.	Lecture	BP104T .2& BP104T .3	Mid Term-1, Quiz & End Sem Exam
26	<b>Acidifiers:</b> Ammonium chloride	Lecture	BP104T .2& BP104T .3	Mid Term-1, Quiz & End Sem Exam
27	Dil. HCl	Lecture	BP104T .2& BP104T .3	Mid Term-1, Quiz & End Sem Exam
28	<i>Tutorial class</i> Acidifiers	Lecture	BP104T .2& BP104T .3	Mid Term-1, Seminar, Quiz & End Sem Exam



29	<b>Antacid:</b> Ideal properties of antacids, combinations of antacids	Lecture	BP104T .2& BP104T .3	Mid Term-1, Quiz & End Sem Exam
30	Sodium Bicarbonate*, Aluminum hydroxide gel	Lecture	BP104T .2& BP104T .3	Mid Term-2, Quiz & End Sem Exam
31	Magnesium hydroxide mixture	Lecture	BP104T .2& BP104T .3	Mid Term-2, Quiz & End Sem Exam
32	<i>Tutorial class</i> Magnesium hydroxide mixture	Lecture	BP104T .2& BP104T .3	Mid Term-2, Quiz & End Sem Exam
33	<b>Cathartics:</b> Magnesium sulphate	Lecture	BP104T .2& BP104T .3	Mid Term-2, Quiz & End Sem Exam
34	Sodium orthophosphate,	Lecture	BP104T .2& BP104T .3	Mid Term-2, Quiz & End Sem Exam
35	Kaolin and Bentonite	Lecture	BP104T .2& BP104T .3	Mid Term-2, Quiz & End Sem Exam
36	<i>Tutorial class</i> Bentonite	Lecture	BP104T .2& BP104T .3	Mid Term-2, Assignment ,Quiz & End Sem Exam
37	<b>Antimicrobials:</b> Mechanism, classification, Potassium permanganate	Lecture	BP104T .2& BP104T .3	Mid Term-2, Quiz & End Sem Exam
38	Boric acid, Hydrogen peroxide*	Lecture	BP104T .2& BP104T .3	Mid Term-2, Quiz & End Sem Exam
39	Chlorinated lime*, Iodine and its preparations	Lecture	BP104T .2& BP104T .3	Mid Term-2, Quiz & End Sem Exam



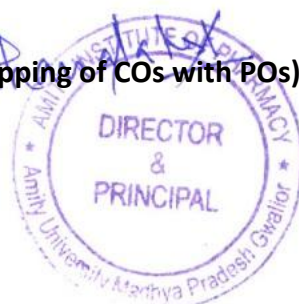
40	<i>Tutorial class</i> Iodine	Lecture	BP104T .2& BP104T .3	Mid Term-2, Quiz & End Sem Exam
41	<b>Expectorants:</b> Potassium iodide	Lecture	BP104T .2& BP104T .3	Mid Term-2, Quiz & End Sem Exam
42	Ammonium chloride	Lecture	BP104T .2& BP104T .3	Mid Term-2, Quiz & End Sem Exam
43	<b>Emetics:</b> Copper sulphate*, Sodium potassium tartarate	Lecture	BP104T .2& BP104T .3	Mid Term-2, Quiz & End Sem Exam
44	<i>Tutorial class</i> Copper sulphate	Lecture	BP104T .2& BP104T .3	Mid Term-2, Seminar, Quiz & End Sem Exam
45	<b>Haematinics:</b> Ferrous sulphate*, Ferrous gluconate	Lecture	BP104T .2& BP104T .3	Mid Term-2, Quiz & End Sem Exam
46	<b>Poison and Antidote:</b> Sodium thiosulphate*	Lecture	BP104T .2& BP104T .3	Mid Term-2, Quiz & End Sem Exam
47	Activated charcoal, Sodium nitrite	Lecture	BP104T .2& BP104T .3	Mid Term-2, Quiz & End Sem Exam
48	<i>Tutorial class</i> Activated charcoal	Lecture	BP104T .2& BP104T .3	Mid Term-2, Seminar, Quiz & End Sem Exam
49	<b>Astringents:</b> Zinc Sulphate, Potash Alum	Lecture	BP104T .2& BP104T .3	Mid Term-2, Quiz & End Sem Exam
50	<b>Radiopharmaceutic als:</b> Radio activity	Lecture	BP104T .5	Mid Term-2, Quiz & End Sem Exam
51	Measurement of radioactivity.	Lecture	BP104T .5	Mid Term-2, Quiz & End Sem Exam
52	<i>Tutorial class:</i> Measurement of	Lecture	BP104T .5	Mid Term-2, Assignment ,Quiz & End Sem Exam





	radioactivity.			
53	Properties of $\alpha$ , $\beta$ , $\gamma$ radiations, Half-life	Lecture	BP104T .5	Mid Term-2, Quiz & End Sem Exam
54	Radio isotopes	Lecture	BP104T .5	Mid Term-2, Quiz & End Sem Exam
55	study of radio isotopes - Sodium iodide $I^{131}$	Lecture	BP104T .5	Mid Term-2, Quiz & End Sem Exam
56	<i>Tutorial class</i> Sodium iodide $I^{131}$	Lecture	BP104T .5	Mid Term-2, Quiz & End Sem Exam
57	Storage conditions	Lecture	BP104T .5	Mid Term-2, Quiz & End Sem Exam
58	Precautions of radioactive substances.	Lecture	BP104T .5	Mid Term-2, Quiz & End Sem Exam
59	Pharmaceutical application of radioactive substances.	Lecture	BP104T .5 & BP104T .3	Mid Term-2, Quiz & End Sem Exam
60	<i>Tutorial class</i> Precautions of radioactive substances.	Lecture	BP104T .5	Mid Term-2, Seminar, Quiz & End Sem Exam

I. Course Articulation Matrix (Mapping of COs with POs)



Course Outcomes	Correlation with POs											Correlation with PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PSO 1	PSO 2	PSO 3
<b>CO104.1</b>	3	-	1	1	-	-	1	-	-	2	2	-	1	-
<b>CO104.2</b>	3	1	-	1	-	-	-	-	-	1	1	2	1	-
<b>CO104.3</b>	3	1	-	2	-	-	1	-	-	2	1	2	1	-
<b>CO104.4</b>	3	2	1	2	-	1	2	1	1	3	2	2	2	1
<b>CO104.5</b>	3	1	2	3	1	1	2	1	1	3	2	1	1	1

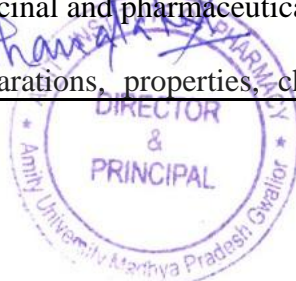
**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “- “

### Sample Question Paper

Amity Institute of pharmacy Department of Pharmaceutical Chemistry I MID-SEMESTER (SEM –I) 2023-24						
Class: B. Pharmacy I Semester						
Subject Name: BP104T PHARMACEUTICAL INORGANIC CHEMISTRY		Time: 1 Hr			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q3,5,7,	Q1, 2,,8,10	Q: 6	Q: 8	-	Q4
Student will be						
CO.1. Able to discuss the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals.						
CO.2. Able to Study the monographs of inorganic drugs and pharmaceuticals.						
CO.3. Able to understand the medicinal and pharmaceutical importance of inorganic compounds.						
CO.4. Able to learn about preparations, properties, chemical reactions and assay of						



inorganic compounds CO.5. Able to discuss radio activity, measurement of radioactivity, properties and pharmaceutical applications of radiopharmaceuticals.			
CO Map	Question No.	Question	Marks
CO1	Q.1	What is achlorhydria?	2
CO1	Q.2	Explain the principle involved in the modified limit test for chloride	2
CO2	Q.3	Give function and composition of ORS	2
CO4	Q.4	Write preparation of sodium bicarbonate	2
CO2	Q.5	What are the ideal properties antacid	2
CO1	Q.6	Explain the principle and procedure involved in the limit test for chloride	10
CO2	Q.7	What are antacid and write a note on Aluminum hydroxide gel	10
CO2	Q.8	Discuss the role of fluoride.	5
CO1 & CO2	Q.9	Write a note on impurities	5
CO2	Q.10	Principle of arsenic limit test	5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**No Attainment Level:**

54.3 % Percentage of students secured more than 60% marks, so this course: PHARMACEUTICAL INORGANIC CHEMISTRY- THEORY (BP104T) not attained any Level.





# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICS

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### Programme Outcomes:

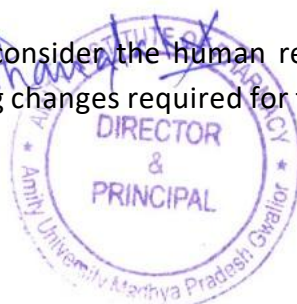
**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and



societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “- “



**PROGRAMME ARTICULATION  
MATRIX**

		PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
I SEM																
	BP105T	-	1	2	1	1	3	2	3	1	1	3				

*H. H. H. H.*



DIRECTOR  
&  
PRINCIPAL



<b>DEPARTMENT OF PHARMACEUTICS</b>
<b>Course Handout</b>
Course : Communication skills – Theory
Course Code: BP105T, Credits: 02, Session:2022-23 (Odd Sem.), Class: B.Pharm - 1st Year
Faculty Name : Dr. Sonia Shrivastava

**A. Introduction:** This course will prepare the young pharmacy student to interact effectively with doctors, nurses, dentists, physiotherapists and other health workers. At the end of this course the student will get the soft skills set to work cohesively with the team as a team player and will add value to the pharmaceutical business.

**B. Course Outcomes:** At the end of the course, students will be able to:

**BP105T:** 1. Understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation

**BP105T:** 2. Communicate effectively (Verbal and Non Verbal)

**BP105T:** 3. Effectively manage the team as a team player

**BP105T:** 4. Develop interview skills.

**BP105T:**5. Develop Leadership qualities and essentials.

**C. Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.



**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

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**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**D. Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	10%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	1.5%
	Student – Teacher interaction	S-T I	1.5%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	2%
End Semester Examination	End Semester Examination	EE	35%
<b>Total</b>			<b>50%</b>

*A. Hirani*  




## E. Syllabus

### UNIT – I 07 Hours

☐ **Communication Skills:** Introduction, Definition, The Importance of Communication, The Communication Process – Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context

☐ **Barriers to communication:** Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers

☐ **Perspectives in Communication:** Introduction, Visual Perception, Language, Other factors affecting our perspective - Past Experiences, Prejudices, Feelings, Environment

### UNIT – II 07 Hours

☐ **Elements of Communication:** Introduction, Face to Face Communication - Tone of Voice, Body Language (Non-verbal communication), Verbal Communication, Physical Communication

☐ **Communication Styles:** Introduction, The Communication Styles Matrix with example for each -Direct Communication Style, Spirited Communication Style, Systematic Communication Style, Considerate Communication Style

43

### UNIT – III 07 Hours

☐ **Basic Listening Skills:** Introduction, Self-Awareness, Active Listening, Becoming an Active Listener, Listening in Difficult Situations

☐ **Effective Written Communication:** Introduction, When and When Not to Use Written Communication - Complexity of the Topic, Amount of Discussion' Required, Shades of Meaning, Formal Communication

☐ **Writing Effectively:** Subject Lines, Put the Main Point First, Know Your Audience, Organization of the Message

### UNIT – IV 05 Hours

☐ **Interview Skills:** Purpose of an interview, Do's and Dont's of an interview

☐ **Giving Presentations:** Dealing with Fears, Planning your Presentation, Structuring Your Presentation, Delivering Your Presentation, Techniques of Delivery

### UNIT – V 04 Hours

☐ **Group Discussion:** Introduction, Communication skills in group discussion, Do's and Dont's of group discussion.

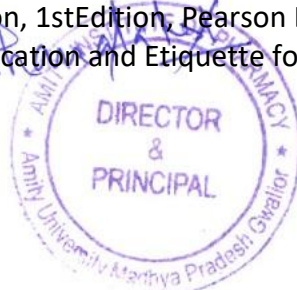
#### A. Examination Scheme:

Components	A	CT	S/V/Q/HA	STI	EE
Weightage (%)	2	10	1.5	1.5	35

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination; A: Attendance

#### B. Suggested Text/Reference Books:

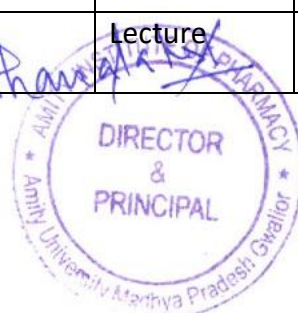
1. Basic communication skills for Technology, Andreja. J. Ruther Ford, 2nd Edition, Pearson Education, 2011
2. Communication skills, Sanjay Kumar, Pushpalata, 1stEdition, Oxford Press, 2011
3. Organizational Behaviour, Stephen .P. Robbins, 1stEdition, Pearson, 2013
4. Brilliant- Communication skills, Gill Hasson, 1stEdition, Pearson Life, 2011
5. The Ace of Soft Skills: Attitude, Communication and Etiquette for success, Gopala Swamy Ramesh, 5thEdition, Pearson, 2013



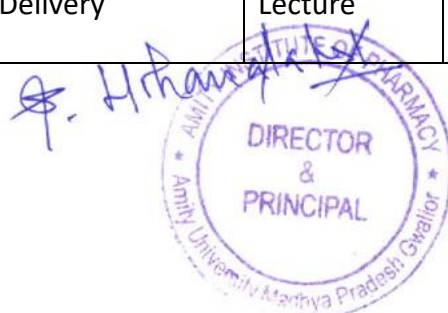
6. Developing your influencing skills, Deborah Dalley, Lois Burton, Margaret, Green hall, 1st Edition Universe of Learning LTD, 2010
7. Communication skills for professionals, Konar nira, 2ndEdition, New arrivals – PHI, 2011
8. Personality development and soft skills, Barun K Mitra, 1stEdition, Oxford Press, 2011
9. Soft skill for everyone, Butter Field, 1st Edition, Cengage Learning india pvt.ltd, 2011
10. Soft skills and professional communication, Francis Peters SJ, 1stEdition, Mc Graw Hill Education, 2011
11. Effective communication, John Adair, 4thEdition, Pan Mac Millan,2009
12. Bringing out the best in people, Aubrey Daniels, 2ndEdition, Mc Graw Hill, 1999

### C. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	<b>Communication Skills:</b> Introduction, Definition, The Importance of Communication, The Communication Process – Source, Message,	Lecture	1	Mid Term-1, Quiz & End Sem Exam
2	Encoding, Channel, Decoding, Receiver, Feedback, Context	Lecture	1	Mid Term-1, Quiz & End Sem Exam
3	<b>Barriers to communication:</b> Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers	Lecture	1	Mid Term-1, Quiz & End Sem Exam
4	Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers	Lecture	1	Mid Term-1, Quiz & End Sem Exam
5	<b>Perspectives in Communication:</b> Introduction, Visual Perception, Language,	Lecture	1	Mid Term-1, Quiz & End Sem Exam
6	Other factors affecting our perspective - Past Experiences, Prejudices, Feelings, Environment	Lecture	1	Mid Term-1, Quiz & End Sem Exam
7	<b>Elements of Communication:</b> Introduction, Face to Face Communication - Tone of Voice,	Lecture	2	Mid Term-1, Quiz & End Sem Exam
8	Body Language (Non-verbal communication), Verbal Communication, Physical Communication	Lecture	2	Mid Term-1, Quiz & End Sem Exam
9	<b>Communication Styles:</b> Introduction, The	Lecture	2	Mid Term-1, Quiz & End Sem Exam



	Communication Styles Matrix with example for each			
10	Direct Communication Style, Spirited Communication Style	Lecture	2	Mid Term-1, Quiz & End Sem Exam
11	Systematic Communication Style, Considerate Communication Style	Lecture	2	Mid Term-1, Quiz & End Sem Exam
12	<b>Basic Listening Skills:</b> Introduction, Self-Awareness, Active Listening	Lecture	2	Mid Term-1, Quiz & End Sem Exam
13	an Active Listener, Listening in Difficult Situations	Lecture	2	Mid Term-1, Quiz & End Sem Exam
14	<b>Effective Written Communication:</b> Introduction, When and When Not to Use Written	Lecture	3	Mid Term-2, Quiz & End Sem Exam
15	Communication - Complexity of the Topic,	Lecture	3	Mid Term-2, Quiz & End Sem Exam
16	Amount of Discussion' Required, Shades of Meaning, Formal Communication	Lecture	3	Mid Term-2, Quiz & End Sem Exam
17	<b>Writing Effectively:</b> Subject Lines, Put the Main Point First	Lecture	3	Mid Term-2, Quiz & End Sem Exam
18	Know Your Audience, Organization of the Message	Lecture	3	Mid Term-2, Quiz & End Sem Exam
19	Know Your Audience, Organization of the Message	Lecture	3	Mid Term-2, Quiz & End Sem Exam
20	<b>Interview Skills:</b> Purpose of an interview, Do's and Dont's of an interview	Lecture	3	Mid Term-2, Quiz & End Sem Exam
21	<b>Interview Skills:</b> Purpose of an interview, Do's and Dont's of an interview	Lecture	3	Mid Term-2, Quiz & End Sem Exam
22	<b>Giving Presentations:</b> Dealing with Fears, Planning your Presentation	Lecture	4	Mid Term-2, Quiz & End Sem Exam
23	<b>Giving Presentations:</b> Dealing with Fears, Planning your Presentation	Lecture	4	Mid Term-2, Quiz & End Sem Exam
24	Structuring Your Presentation, Delivering Your Presentation,	Lecture	4	Mid Term-2, Quiz & End Sem Exam
25	Techniques of Delivery	Lecture	4	Mid Term-2, Quiz & End Sem Exam



26	<b>Group Discussion:</b> Introduction, Communication skills in group discussion	Lecture	5	Mid Term-2, Quiz & End Sem Exam
27	<b>Group Discussion:</b> Introduction, Communication skills in group discussion	Lecture	5	Mid Term-2, Quiz & End Sem Exam
28	Do's and Dont's of group discussion	Lecture	5	Mid Term-2, Quiz & End Sem Exam
29	Do's and Dont's of group discussion	Lecture	5	Mid Term-2, Quiz & End Sem Exam
30	Do's and Dont's of group discussion	Lecture	5	Mid Term-2, Quiz & End Sem Exam

#### D. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES											CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
<b>BP105T: 1</b>	<b>BP105T: 1.</b> Understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation	0	1	2	1	3	3	-	3	2	-	1				



<b>BP105T: 2</b>	<b>BP105T: 2.</b> Communicate effectively (Verbal and Non Verbal)	0	1	2	1	3	3	-	3	2	-	1				
<b>BP105T: 3</b>	<b>BP105T: 3.</b> Effectively manage the team as a team player	0	1	2	1	3	3	-	3	2	-	1				
<b>BP105T: 4</b>	<b>BP105T: 4.</b> Develop interview skills.	-	-	2	1	3	3	-	3	2	-	1				
<b>BP105T: 5</b>	<b>BP105T:5.</b> Develop Leadership qualities and essentials.	2	1	1	1	3	2	1	1	1	1	3				

### Sample Question Paper

Amity Institute of Pharmacy Department of Pharmaceutics I MID-SEMESTER (SEM –Ist) 2023-24						
Class: B. Pharm, I Semester						
Subject Name: Communications Skills BP105T-Theory		Time: 1 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1, Q.5, Q.3	Q.2, Q.4				
<p>The student will be able to</p> <p><b>BP105T: 1.</b> Understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation</p> <p><b>BP105T: 2.</b> Communicate effectively (Verbal and Non Verbal)</p> <p><b>BP105T: 3.</b> Effectively manage the team as a team player</p>						



CO Map	Question No.	Question	Marks
CO5	Q.1	Mention a few ways to improve speaking skills.	5
CO3	Q.2	Write a short note on role of body language during communication.	5
CO3	Q.3	Differentiate between verbal and non-verbal communication.	5
CO4	Q.4	Discuss the role of tone and voice in communication verbally.	5
CO5	Q.5	What is the importance of feedback in the process of communication?	10

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

### Attainment Level 3:

81.9 % of students secured more than 60% marks, so this course Communicationa Skills-Theory (BP105T) attainment level is 3.



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# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACOLOGY

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

#### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### Programme Outcomes:

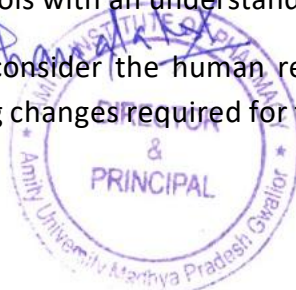
**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and





societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “- “



**PROGRAMME ARTICULATION  
MATRIX**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
I SEM																	
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

  
  
**DIRECTOR  
&  
PRINCIPAL**



# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

<b>DEPARTMENT OF PHARMACEUTICS</b>
<b>Course Handout</b>
Course : Remedial Biology THEORY
Course Code : BP106RBT, Crédits : 02, Session :2023-24 (Odd Sem.), Class : B.Pharm. 1st Year
Faculty Name: Dr. P. Sagar

- A. Introduction:** This course introduces the basics of plant and animal biology, focusing on human anatomy and physiology. It covers the classification of life, plant structure, human body systems, and key biological processes, providing essential knowledge for students in related fields.
- B. Course Outcomes:** At the end of the course, students will be able to:
- BP106RBT.1.** Students will learn the characteristics of living organisms, the classification of life into five kingdoms, and the morphology of flowering plants
- BP106RBT.2.** Students will gain an understanding of human physiology, including body fluids, the circulatory system, digestion and absorption, respiration, and excretion.
- BP106RBT.3.** Students will learn about the structure and function of the nervous system, the role of different brain parts, and the importance of endocrine glands and hormones.
- BP106RBT.4.** Students will learn about plant physiology, including essential minerals, photosynthesis, plant respiration, and growth and development.
- BP106RBT.5.** Students will understand the cell as the basic unit of life, including cell organelles and division, and learn about different types of tissues and their functions.
- C. Programme Outcomes:**
- [PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.



**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

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**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

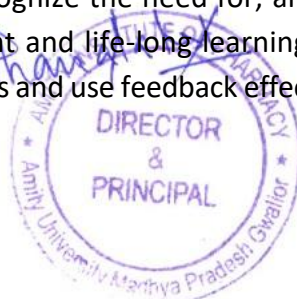
**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

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**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify



learning needs and to satisfy these needs on an ongoing basis.

**D. Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	20%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	3%
	Student – Teacher interaction	S-T I	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	70%
<b>Total</b>			<b>100%</b>

**E. Syllabus**

**UNIT – I**

**Living world:** Definition and characters of living organisms, Diversity in the living world, Binomial nomenclature, Five kingdoms of life and basis of classification. Salient features of Monera, Protista, Fungi, Animalia and Plantae, Virus,

**Morphology of Flowering plants**

Morphology of different parts of flowering plants – Root, stem, inflorescence, flower, leaf, fruit, seed. General Anatomy of Root, stem, leaf of monocotyledons & Dicotyledones.

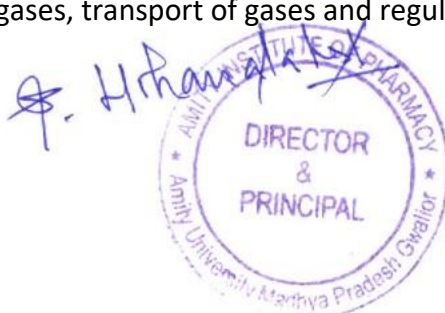
**UNIT – II**

**Body fluids and circulation:** Composition of blood, blood groups, coagulation of blood, Composition and functions of lymph, Human circulatory system, Structure of human heart and blood vessels, Cardiac cycle, cardiac output and ECG

**Digestion and Absorption:** Human alimentary canal and digestive glands, Role of digestive enzymes, Digestion, absorption and assimilation of digested food

**Breathing and respiration:** Human respiratory system, Mechanism of breathing and its regulation, Exchange of gases, transport of gases and regulation of respiration, Respiratory volumes.

**UNIT – III**



**Excretory products and their elimination:** Modes of excretion, Human excretory system- structure and function, Urine formation, Rennin angiotensin system.

**Neural control and coordination:** Definition and classification of nervous system, Structure of a neuron, Generation and conduction of nerve impulse, Structure of brain and spinal cord, Functions of cerebrum, cerebellum, hypothalamus and medulla oblongata

**Chemical coordination and regulation:** Endocrine glands and their secretions, Functions of hormones secreted by endocrine glands

**Human reproduction:** Parts of female reproductive system, Parts of male reproductive system, Spermatogenesis and Oogenesis, Menstrual cycle

#### UNIT – IV

**Plants and mineral nutrition:** Essential mineral, macro and micronutrients, Nitrogen metabolism, Nitrogen cycle, biological nitrogen fixation

**Photosynthesis:** Autotrophic nutrition, photosynthesis, Photosynthetic pigments, Factors affecting photosynthesis.

#### UNIV – V

**Plant respiration:** Respiration, glycolysis, fermentation (anaerobic).

**Plant growth and development:** Phases and rate of plant growth, Condition of growth, Introduction to plant growth regulators

**Cell - The unit of life:** Structure and functions of cell and cell organelles. Cell division

**Tissues:** Definition, types of tissues, location and functions.

#### F. Examination Scheme:

Components	A	CT	S/V/Q/HA	STI	EE
Weightage (%)	2	10	1.5	1.5	35

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination; A: Attendance

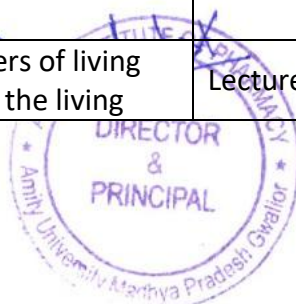
#### G. Suggested Text/Reference Books:

- Text book of Biology by S. B. Gokhale
- A Text book of Biology by Dr. Thulajappa and Dr. Seetaram.
- A Text book of Biology by B.V. Sreenivasa Naidu
- A Text book of Biology by Naidu and Murthy
- Botany for Degree students By A.C.Dutta.
- Outlines of Zoology by M. Ekambaranatha ayyer and T. N. Ananthkrishnan.
- A manual for pharmaceutical biology practical by S.B. Gokhale and C. K. Kokate

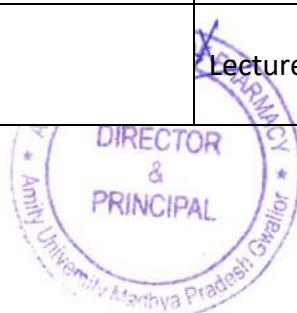
#### H. Lecture Plan

I.

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Definition and characters of living organisms; Diversity in the living	Lecture	1	Mid Term-1, Quiz & End



	world			Sem Exam
2	Binomial nomenclature; Five kingdoms of life and basis of classification	Lecture	1	Mid Term-1, Quiz & End Sem Exam
3	Salient features of Monera, Protista, Fungi, Animalia and Plantae	Lecture	1	Mid Term-1, Quiz & End Sem Exam
4	<i>Salient features of Virus</i>	Lecture	1	Mid Term-1, Quiz & End Sem Exam
5	Morphology of different parts of flowering plants – Root, stem, leaf	Lecture	1	Mid Term-1, Quiz & End Sem Exam
6	Morphology of inflorescence, flower, fruit, seed;	Lecture	1	Mid Term-1, Quiz & End Sem Exam
7	General Anatomy of Root, stem, leaf of monocotyledons & Dicotyledones	Lecture	1	Mid Term-1, Quiz & End Sem Exam
8	Composition of blood, blood groups, coagulation of blood; Composition and functions of lymph	Lecture	2	Mid Term-1, Quiz & End Sem Exam
9	Human circulatory system; Structure of human heart and blood vessels	Lecture	2	Mid Term-1, Quiz & End Sem Exam
10	Cardiac cycle, cardiac output, and ECG	Lecture	2	Mid Term-1, Quiz & End Sem Exam
11	Human alimentary canal and digestive glands	Lecture	2	Mid Term-1, Quiz & End Sem Exam
12	Role of digestive enzymes; Digestion, absorption, and assimilation of digested food	Lecture	2	Mid Term-1, Quiz & End Sem Exam
13	Human respiratory system; Mechanism of breathing and its regulation	Lecture	2	Mid Term-1, Quiz & End Sem Exam
14	Exchange of gases, transport of gases and regulation of respiration; Respiratory volumes	Lecture	2	Mid Term-1, Quiz & End Sem Exam
15	Modes of excretion; Human excretory system- structure and function	Lecture	2	Mid Term-1, Quiz & End Sem Exam
16	Urine formation;	Lecture	2	Mid Term-1, Quiz & End Sem Exam



17	Rennin angiotensin system	Lecture	2	Mid Term-1, Quiz & End Sem Exam
18	Definition and classification of nervous system; Structure of a neuron	Lecture	3	Mid Term-1, Quiz & End Sem Exam
19	Generation and conduction of nerve impulse; Structure of brain and spinal cord	Lecture	3	Mid Term-1, Quiz & End Sem Exam
20	Functions of cerebrum, cerebellum, hypothalamus, and medulla oblongata	Lecture	3	Mid Term-1, Quiz & End Sem Exam
21	Endocrine glands and their secretions; Functions of hormones secreted by endocrine glands	Lecture	3	Mid Term-1, Quiz & End Sem Exam
22	Parts of female and male reproductive system	Lecture	3	Mid Term-1, Quiz & End Sem Exam
23	Spermatogenesis and Oogenesis; Menstrual cycle	Lecture	3	Mid Term-1, Quiz & End Sem Exam
24	Essential minerals, macro and micronutrients; Nitrogen metabolism, Nitrogen cycle, biological nitrogen fixation	Lecture	4	Mid Term-1, Quiz & End Sem Exam
25	Autotrophic nutrition, photosynthesis, Photosynthetic pigments, Factors affecting photosynthesis	Lecture	4	Mid Term-1, Quiz & End Sem Exam
26	Respiration, glycolysis, fermentation (anaerobic)	Lecture	4	Mid Term-1, Quiz & End Sem Exam
27	Phases and rate of plant growth, Condition of growth, Introduction to plant growth regulators	Lecture	5	Mid Term-1, Quiz & End Sem Exam
28	Structure and functions of cell and cell organelles; Cell division	Lecture	5	Mid Term-1, Quiz & End Sem Exam
29	Definition, types of tissues,	Lecture	5	Mid Term-1, Quiz & End Sem Exam
30	location, and functions of tissues	Lecture	5	Mid Term-1, Quiz & End Sem Exam

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**J. Course Articulation Matrix (Mapping of COs with POs)**

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
<b>BP106RBT.1</b>	Students will learn the characteristics of living organisms, the classification of life into five kingdoms, and the morphology of flowering plants.	3	2	-	-	3	2	-	-	-	-	-	-			
<b>BP106RBT.2.</b>	Students will gain an understanding of human physiology, including body fluids, the circulatory system, digestion and absorption, respiration, and excretion.	3	2	-	-	3	2	-	-	-	-	-	-			
<b>BP106RBT.3.</b>	Students will learn about the structure and function of the nervous system, the role of different brain parts, and the importance of endocrine glands and hormones.	3	2	-	-	3	2	-	-	-	-	-	-			

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 DIRECTOR & PRINCIPAL  
 Amity University, Madhya Pradesh Gwalior

<b>BP106RBT.4.</b>	Students will learn about plant physiology, including essential minerals, photosynthesis, plant respiration, and growth and development.	3	2	-	-	3	2	-	-	-	-	-	-	-
<b>BP106RBT.5.</b>	Students will understand the cell as the basic unit of life, including cell organelles and division, and learn about different types of tissues and their functions.	3	2	-	-	3	2	-	-	-	-	-	-	-

### Sample Question Paper

Amity Institute of Pharmacy Department of Pharmaceutics I MID-SEMESTER (SEM –Ist) 2023-24						
Class: B.Pharm, I Semester						
Subject Name: BP106RBT Remedial Biology Theory		Time: 1 Hrs			Max. Marks: 10	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.3, 4, 1, 7	Q.1, 2, 5,	8			
The student will be able to						

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<p><b>CO1.</b> Students will learn the characteristics of living organisms, the classification of life into five kingdoms, and the morphology of flowering plants.</p> <p><b>CO2.</b> Students will gain an understanding of human physiology, including body fluids, the circulatory system, digestion and absorption, respiration, and excretion.</p> <p><b>CO3.</b> Students will learn about the structure and function of the nervous system, the role of different brain parts, and the importance of endocrine glands and hormones.</p> <p><b>CO4.</b> Students will learn about plant physiology, including essential minerals, photosynthesis, plant respiration, and growth and development.</p> <p><b>CO5.</b> Students will understand the cell as the basic unit of life, including cell organelles and division, and learn about different types of tissues and their functions.</p>			
CO Map	Question No.	Question	Marks
CO1	Q.1	Describe the composition and coagulation mechanism of the blood.	10
CO1	Q.2	Explain the morphology of the root and stem.	10
CO1	Q.3	Define a living organism and give its basic characteristics.	5
CO4	Q.4	What are the blood group types, and what kind of antigens and antibodies are located on the cell surface of each blood group?	5
CO2	Q.5	Explain the Human Circulatory system.	5
CO1	Q.6	What are the kingdoms of life, and what are their salient features?	5
CO2	Q.7	Write a brief note on binomial nomenclature.	5
CO3	Q.8	Draw a neat labeled diagram of the heart and give a brief on each part.	5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**No Attainment Level:**

42.9 % Percentage of students secured more than 60% marks, so this course REMEDIAL BIOLOGY THEORY (BP106T) not attained any Level.





AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACOLOGY

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

#### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

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**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

#### Programme Outcomes:

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

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#### **Programme Specific Outcomes:**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

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1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “- “



**PROGRAMME ARTICULATION  
MATRIX**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
I SEM																
	BP107P	3	1	2	-	1	2	2	1	3	2	2	-	1	-	1

*H. H. H. H.*



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&  
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<b>DEPARTMENT OF PHARMACOLOGY</b>
<b>Course Handout</b>
Course: HUMAN ANATOMY AND PHYSIOLOGY – I PRACTICAL
Course Code : BP107P, Crédits: 02, Session :2023-24 (Odd Sem.), Class : B.Pharm. 1st Year
Faculty Name: Mr. Arvind Singh Jadon

- A. Introduction:** This course is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.
- B. Course Outcomes:** At the end of the course, students will be able to:
- BP107P.1 Effectively use the microscope for microscopic study of various tissues.
  - BP107P.2. Identify axial and appendicular bones of human skeleton.
  - BP107P.3. Explain the gross morphology, structure and functions of various organs of human body.
  - BP107P.4 Identify different tissues and organs of different systems of human body.
  - BP107P.5. Perform the haematological test like CT-BT, blood cell count, haemoglobin estimation, bleeding/clotting time, ESR etc.
  - BP107P.6 Record the blood pressure, heart rate, pulse rate and respiratory volume.

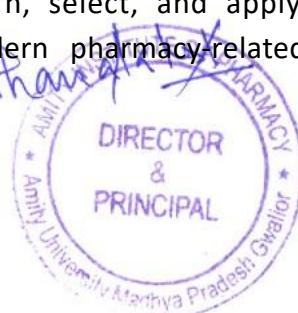
**Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.



**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**C. Programme Specific Outcomes:**

**PSO 1:** Practical physiology is complimentary to the theoretical discussions in physiology.

**PSO 2:** Practical allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings.

**PSO 3:** This is helpful for developing an insight on the subject.

**Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	10%
	Mid Term 2		
	Lab record	LR	1%
	Viva	V	2%





Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	2%
End Semester Examination	End Semester Examination	EE	35%
<b>Total</b>			<b>50%</b>

#### D. Syllabus

1. Study of compound microscope.
2. Microscopic study of epithelial and connective tissue
3. Microscopic study of muscular and nervous tissue
4. Identification of axial bones
5. Identification of appendicular bones
6. Introduction to hemocytometry.
7. Enumeration of white blood cell (WBC) count
8. Enumeration of total red blood corpuscles (RBC) count
9. Determination of bleeding time
10. Determination of clotting time
11. Estimation of hemoglobin content
12. Determination of blood group.
13. Determination of erythrocyte sedimentation rate (ESR).
14. Determination of heart rate and pulse rate.
15. Recording of blood pressure. Recommended Books (Latest Edition)

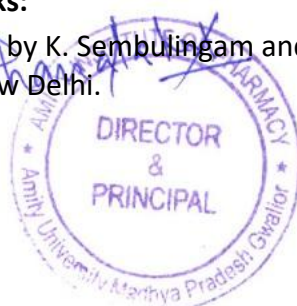
#### E. Examination Scheme:

Components	A	CT	LR	V	EE
Weightage (%)	2	10	1	2	35

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination; A: Attendance

#### F. Suggested Text/Reference Books:

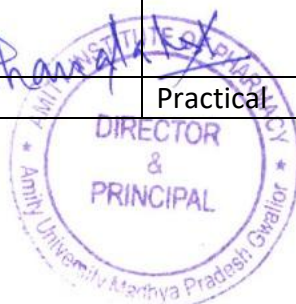
1. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brothers medical publishers, New Delhi.



2. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
3. Physiological basis of Medical Practice-Best and Taylor. Williams & Wilkins Co,Riverview,MI USA
4. Text book of Medical Physiology- Arthur C,Guyton andJohn.E. Hall. Miamisburg, OH, U.S.A.
5. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.

**G. Lecture Plan**

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Study of the compound microscope.	Practical	CO1	Mid Term-1 and 2, Quiz & End Sem Exam
2	Microscopic study of epithelial and connective tissue	Practical	CO4	Mid Term-1 and 2, Quiz & End Sem Exam
3	Microscopic study of muscular and nervous tissue	Practical	CO4	Mid Term-1 and 2, Quiz & End Sem Exam
4	Identification of axial bones	Practical	CO3	Mid Term-1 and 2, Quiz & End Sem Exam
5	Identification of appendicular bone anatomical terminology.	Practical	CO3	Mid Term-1 and 2, Quiz & End Sem Exam
6	Introduction to	Practical		Mid



	hemocytometry		CO2	Term-1 and 2, Quiz & End Sem Exam
7	Enumeration of white blood cell (WBC) count	Practical	CO5	Mid Term-1 and 2, Quiz & End Sem Exam
8	Quiz	Practical		Mid Term-1 and 2, Quiz & End Sem Exam
9	Enumeration of total red blood corpuscles (RBC)	Practical	CO5	Mid Term-1 and 2, Quiz & End Sem Exam
10	Determination of bleeding time	Practical	CO5	Mid Term-1 and 2, Quiz & End Sem Exam
11	Determination of clotting time	Practical	CO5	Mid Term-1 and 2, Quiz & End Sem Exam
12	Revision--	Practical		Mid Term-1 and 2, Quiz & End Sem Exam



13	Estimation of hemoglobin content	Practical	CO5	Mid Term-1 and 2, Quiz & End Sem Exam
14	Determination of blood group	Practical	CO5	Mid Term-1 and 2, Quiz & End Sem Exam
15	Determination of erythrocyte sedimentation rate (ESR).	Practical	CO5	Mid Term-1 and 2, Quiz & End Sem Exam
16	Unit test	Practical		Mid Term-1 and 2, Quiz & End Sem Exam
17	Determination of heart rate and pulse rate.	Practical	CO6	Mid Term-1 and 2, Quiz & End Sem Exam
18	Recording of blood pressure.	Practical	CO6	Mid Term-1 and 2, Quiz & End Sem Exam



## H. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3	
<b>BP107P.1</b>	Effectively use the microscope for microscopic study of various tissues.	3	-	-	-	1	2	2	-	-	-	-	-	-	-	-	1
<b>BP107P.2</b>	Identify axial and appendicular bones of human skeleton.	3	-	-	1	-	1	-	-	-	-	2	-	-	-	-	-
<b>BP107P.3</b>	Explain the gross morphology, structure and functions of various organs of human body.	3	2	-	3	-	2	-	-	-	-	3	-	-	-	-	-
<b>BP107P.4</b>	Identify different tissues and organs of different systems of human body.	2	2	1	3	-	1	-	-	2	-	2	-	-	-	-	-
<b>BP107P.5</b>	Perform the haematological test like CT-BT, blood cell count, haemoglobin estimation, bleeding/clotting time, ESR etc.	3	-	1	-	2	-	-	-	2	-	2	-	-	-	-	1
<b>BP10P.6</b>	Record the blood pressure, heart rate, pulse rate and respiratory volume.	3	-	-	1	-	-	-	1	2	-	1	-	-	-	-	-



**Sample Question Paper**

Amity Institute of Pharmacy Department of Pharmacology I MID-SEMESTER (SEM –Ist) 2023-24						
Class: B.Pharm, I Semester						
Subject Name: BP107P Human Anatomy and Physiology-I		Time: 4 Hrs			Max. Marks: 40	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,2,4,10	Q.8,9,6	Q.5,3	Q.7		
Student will be able to CO1. Effectively use the microscope for microscopic study of various tissues. CO2. Identify axial and appendicular bones of human skeleton. CO3. Explain the gross morphology, structure and functions of various organs of human body. CO4. Identify different tissues and organs of different systems of human body.						
CO Map	Question No.	Question				Marks
CO1	Q.1a	What are the different part of the microscope				2
CO2	Q.1b	Write name of facial bones.				2
CO2	Q.1c	Write functions of connective tissue.				2
CO4	Q.1d	Why is epithelium tissue work as a protective tissue?				2
CO2 CO3	Q.1e	Identify the correct location of carpal bones.				2
	Q.2	Experiment: To Perform the microscopic study of muscular and nervous tissue.				25
	Q.3	Viva				5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**Attainment Level:**

95.7 % Percentage of students secured more than 60% marks, so this course Human Anatomy and Physiology I – Practical (BP107P) attained Level 3.

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# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

**Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24**

### **Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

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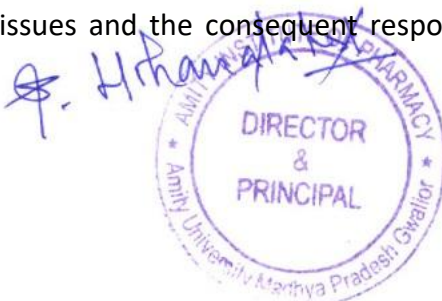
**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

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**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “-”

PROGRAMME ARTICULATION MATRIX																
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ISEM	BP108P	3	2	3	1	1	2		3		1	2				

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## DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

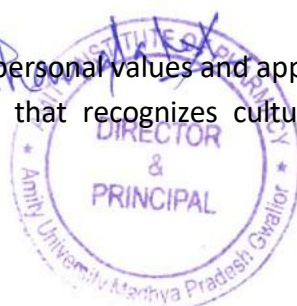
### Course Handout

Course : : Medicinal Chemistry I – (Practical)

Course Code : BP406P, Crédits : 02, Session : 2023-24 (Odd Sem.), Class : B.Pharm. IV Year

Faculty Name: Dr. Dr. Sathish K. Mittapalli

- A. Introduction:** This subject deals with the monographs of inorganic drugs and pharmaceuticals.
- B. Course Outcomes:** At the end of the course, students will be able to:
- BP406P.1.** Preparation of drugs/ intermediates
  - BP406P.2.** Assay of drugs
  - BP406P.3.** Determination of Partition coefficient for any two drugs
  - BP406P.4.** carryout various volumetric and electrochemical titrations.
  - BP406P.5.** develop analytical skills.
- C. Programme Outcomes:**
- [PO.1].Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
- [PO.2].Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
- [PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
- [PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
- [PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.
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#### D. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	10%
	Mid Term 2		
	Lab record	LR	1%
	Viva	V	2%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the EndSemester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	2%
End Semester Examination	End Semester Examination	EE	35%
<b>Total</b>			<b>50%</b>

#### E. Syllabus;

##### I Preparation of drugs/ intermediates

- 1 1,3-pyrazole
- 2 1,3-oxazole
- 3 Benzimidazole
- 4 Benztriazole
- 5 2,3- diphenyl quinoxaline
- 6 Benzocaine
- 7 Phenytoin
- 8 Phenothiazine



9 Barbiturate

## II Assay of drugs

1 Chlorpromazine

2 Phenobarbito

3 Atropine

4 Ibuprofen

5 Aspirin

6 Furosemide

### Examination Scheme:

Components	A	CT	LR	V	EE
Weightage (%)	2	10	1	2	35

CT: Class Test, LR: Lab Record, V: Viva, EE: End Semester Examination; A: Attendance

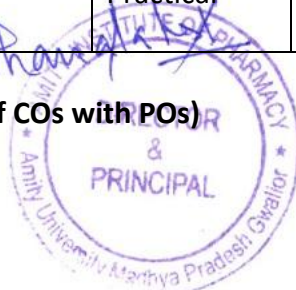
### A. Suggested Text/Reference Books:

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
2. Foye's Principles of Medicinal Chemistry.
3. Burger's Medicinal Chemistry, Vol I to IV.
4. Introduction to principles of drug design- Smith and Williams.
5. Remington's Pharmaceutical Sciences.
6. Martindale's extra pharmacopoeia

### Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Preparation of 1,3-pyrazole	Practical	CO1, 2, 4	Mid Term-1, Quiz & End Sem Exam
2	Preparation of 1,3-oxazole	Practical	CO1, 2, 4	Mid Term-1, Quiz & End Sem Exam
3	Preparation of 1,3-oxazole	Practical	CO1, 2, 4	Mid Term-1, Quiz & End Sem Exam
4	<i>Preparation of Benzotriazole</i>	Practical	CO1,3, 4,	Mid Term-1, Quiz & End Sem Exam
5	Preparation of 2,3-diphenyl quinoxaline	Practical	CO1, 3, 4,	Mid Term-1, Quiz & End Sem Exam
6	Preparation of Benzocaine	Practical	CO1,3, 4,	Mid Term-1, Quiz & End Sem Exam
7	Preparation of Phenytoin	Practical	CO1, 4,5,	Mid Term-2, Quiz & End Sem Exam
8	Preparation of Phenothiazine	Practical	CO1, 4,5,	Mid Term-2, Quiz & End Sem Exam
9	Preparation of Barbiturate	Practical	CO1, 4,5,	Mid Term-2, Quiz & End Sem Exam
10	Assay of Ibuprofen	Practical	CO1, 4,5,	Mid Term-2, Quiz & End Sem Exam
11	Assay of Aspirin	Practical	CO1,4,5,	Mid Term-2, Quiz & End Sem Exam
12	Assay of Furosemide	Practical	CO1, 4,5,	Mid Term-2, Quiz & End Sem Exam

### B. Course Articulation Matrix (Mapping of COs with POs)



CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES										
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11
BP406P.1	Preparation of Phenytoin	2	-	2	1	2	1	-	2	1	2	1
BP406P.2.	Preparation of Benzimidazole	2	-	-	1	-	1	-	-	-	-	3
BP406P.3.	Preparation of 2,3- diphenyl quinoxaline	2	2	2	1	-	2	-	2	-	-	3
BP406P.4.	Assay of Chlorpromazine	2	2	2	1	-	2	-	2	-	-	3
BP406P.5.	Determination of Partition coefficient for any two drugs	1	2	3	-	-	2	-	2	-	-	3

**Sample Question Paper**

<b>Amity Institute of Pharmacy</b> <b>Department of pharmaceutical chemistry</b> <b>I MID-SEMESTER(SEM-IV) 2023-24</b>						
Class: B.Pharm, IV Semester						
Subject Name: BP108P- <b>MEDICINAL CHEMISTRY</b> - I -Practical		Time: 4Hrs			Max.Marks: 40	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4,5	Q.4	Q.2,3,5	Q.2,3,5		
Student will be able to						



**CO.1.** Preparation of drugs/ intermediates  
**CO.2.** To Perform identification tests as per Indian Pharmacopoeia.  
**CO.3.** Assay of drug  
**CO.4.** Understand the medicinal and pharmaceutical importance of medicinal compounds  
**CO.5.** Determination of Partition coefficient for any two drugs

COMap	Question No.	Question	Marks
CO1,2,4	Q.1a	Synopsis-Assay of Chlorpromazine	2
CO1,2,4	Q.1b	Synopsis-Assay of Furosemide	2
CO1,2,4	Q.1c	Determination of Partition coefficient for any two drugs	2
CO 3, 5	Q.1d	Preparation of Phenytoin	2
CO 3, 5	Q.1e	Synopsis- write the molecular formula and uses of Phenothiazine	2
CO1,2, 4,5	Q.2	Experiment To perform the synthesis of Benzotriazole.	25
CO1,2,3,4,5	Q.3	Viva	5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

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AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICS

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### **Programme Outcomes:**

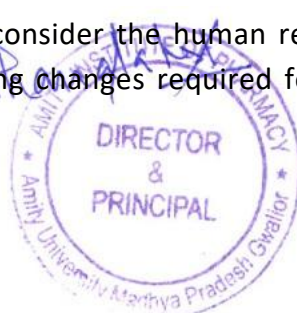
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#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “- “



**PROGRAMME ARTICULATION  
MATRIX**

		PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
I SEM	BP109P	3	1	2	1	1	2	-	2	-	3	2		3	2	-

*H. H. H. H.*



DIRECTOR  
&  
PRINCIPAL



## DEPARTMENT OF PHARMACEUTICS

### Course Handout

Course : PHARMACEUTICS – I PRACTICAL

Course Code : BP109P, Crédits : 02, Session: 2023-24 (Odd Sem.), Class: B. Pharm. 1st Year

Faculty Name: Dr. Vikas Pandey, Dr. Jovita Kanoujia

**A. Introduction:** The course is designed to impart skill development in the arts and science of preparing the different conventional dosage forms.

**B. Course Outcomes:** At the end of the course, students will be able to:

**BP109P.1.** Recall the principles used in the preparation of solid, liquid, and semi-solid dosage forms.

**BP109P.2.** Operate equipment used in the manufacturing of different dosage forms

**BP109P.3.** Formulate various conventional dosage forms such as solid dosage forms.

**BP109P.4.** Design various liquid dosage forms and semi-solid dosage forms.

**BP109P.5.** Estimate the ingredients calculation for preparation of dosage form

### C. Programme Outcomes:

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

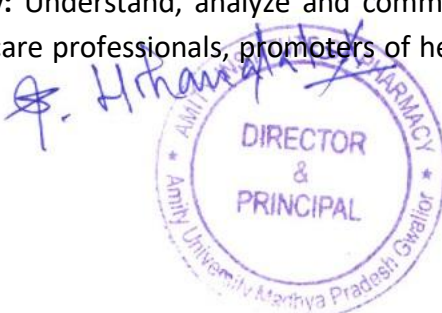
**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).



**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

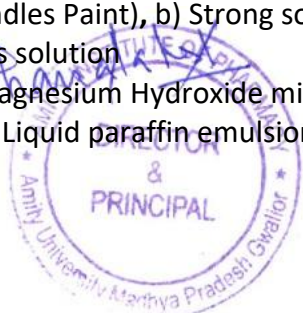
**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### D. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	10%
	Mid Term 2		
	Lab record	LR	1%
	Viva	V	2%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	2%
End Semester Examination	End Semester Examination	EE	35%
<b>Total</b>			<b>50%</b>

#### E. Syllabus

- 1. Syrups** a) Syrup IP'66, b) Compound syrup of Ferrous Phosphate BPC'68
- 2. Elixirs** a) Piperazine citrate elixir, b) Paracetamol pediatric elixir
- 3. Linctus** a) Terpin Hydrate Linctus IP'66
- 4. Solutions** a) Iodine Throat Paint (Mandles Paint), b) Strong solution of ammonium acetate, c) Cresol with soap solution, d) Lugol's solution
- 5. Suspensions** a) Calamine lotion, b) Magnesium Hydroxide mixture, c) Aluminium Hydroxide gel
- 6. Emulsions** a) Turpentine Liniment, b) Liquid paraffin emulsion



**7. Powders and Granules** a) ORS powder (WHO), b) Effervescent granules, c) Dusting powder, d) Divided powders

**8. Suppositories** a) Glycero gelatin suppository, b) Cocoa butter suppository, c) Zinc Oxide suppository

**8. Semisolids** a) Sulphur ointment, b) Non staining-iodine ointment with methyl salicylate, c) Carbopol gel

**9. Gargles and Mouthwashes** a) Iodine gargle, b) Chlorhexidine mouthwash

#### F. Examination Scheme:

Components	A	CT	LR	V	EE
Weightage (%)	2	10	1	2	35

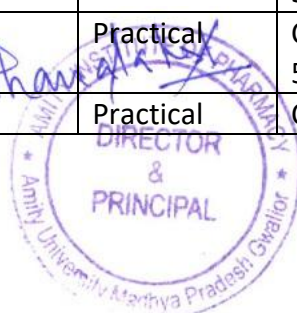
CT: Class Test, LR: Lab Record, V: Viva, EE: End Semester Examination; A: Attendance

#### G. Suggested Text/Reference Books:

- H.C. Ansel et al., Pharmaceutical Dosage Form and Drug Delivery System, Lippincott Williams and Walkins, New Delhi.
- Carter S.J., Cooper and Gunn's-Dispensing for Pharmaceutical Students, CBS publishers, New Delhi.
- M.E. Aulton, Pharmaceutics, The Science & Dosage Form Design, Churchill Livingstone, Edinburgh.
- Indian pharmacopoeia.
- British pharmacopoeia.

#### H. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	To prepare and submit simple syrup IP	Practical	CO1, 2, 4, 5	Mid Term-1, Quiz & End Sem Exam
2	To prepare and submit simple syrup USP	Practical	CO1, 2, 4, 5	Mid Term-1, Quiz & End Sem Exam
3	To prepare and submit Paracetamol pediatric elixir	Practical	CO1, 2, 4, 5	Mid Term-1, Quiz & End Sem Exam
4	To prepare and submit Iodine Throat Paint	Practical	CO1, 2, 4, 5	Mid Term-1, Quiz & End Sem Exam
5	To prepare and submit Lugol's solution	Practical	CO1, 2, 4, 5	Mid Term-1, Quiz & End Sem Exam
6	To prepare and submit Calamine lotion	Practical	CO1, 2, 4, 5	Mid Term-1, Quiz & End Sem Exam
7	To prepare and submit turpentine liniment	Practical	CO1, 2, 4, 5	Mid Term-1, Quiz & End Sem Exam
8	To prepare and submit liquid paraffin emulsion	Practical	CO1, 2, 4, 5	Mid Term-2, Quiz & End Sem Exam
9	To prepare and submit zinc oxide dusting powder	Practical	CO1, 2, 3, 5	Mid Term-2, Quiz & End Sem Exam
10	To prepare and submit ORS powder	Practical	CO1, 2, 3, 5	Mid Term-2, Quiz & End Sem Exam
11	To prepare and submit effervescent powder	Practical	CO1, 2, 3, 5	Mid Term-2, Quiz & End Sem Exam
12	To prepare and submit	Practical	CO1, 2, 4, 5	Mid Term-2, Quiz



	Glycero gelatin suppository.		5	& End Sem Exam
13	To prepare and submit Non staining-iodine ointment with methyl salicylate	Practical	CO1, 2, 4, 5	Mid Term-2, Quiz & End Sem Exam
14	To prepare and submit Carbopol gel	Practical	CO1, 2, 4, 5	Mid Term-2, Quiz & End Sem Exam
15	To prepare and submit iodine gargle	Practical	CO1, 2, 4, 5	Mid Term-2, Quiz & End Sem Exam

### I. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES														
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P O 13	P O 14	P O 15
<b>BP109P.1</b>	To recall the principles used in the preparation of solid, liquid, and semi-solid dosage forms.	3		2	1	2	1	-	2	1	2	1	3	2	-	
<b>BP109P.2.</b>	Operate equipment used in the manufacturing of different dosage forms	2	-	-	1	-	1	-	-	-	-	3	2	2	-	
<b>BP109P.3.</b>	Formulate various conventional dosage forms such as solid dosage forms.	3	2	2	1	-	2	-	2	-	-	3	3	3	-	
<b>BP109P.4.</b>	Design various liquid dosage forms and semi-solid dosage forms.	2	2	2	1	-	2	-	2	-	-	3	3	3	-	
<b>BP109P.5.</b>	Estimate the ingredients calculation for preparation of dosage form.	1	2	3	-	-	2	-	2	-	-	3	3	2	-	



## Sample Question Paper

Amity Institute of Pharmacy Department of Pharmaceutics I MID-SEMESTER (SEM –Ist) 2022-23						
Class: B. Pharm, I Semester						
Subject Name: BP109P Pharmaceutics-I Practical		Time: 4 Hrs			Max. Marks: 40	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		
Student will be able to <b>CO.1.</b> To recall the principles used in the preparation of solid, liquid, and semi-solid dosage forms. <b>CO.2.</b> Operate equipment used in the manufacturing of different dosage forms <b>CO.3.</b> Formulate various conventional dosage forms such as solid dosage forms. <b>CO.4.</b> Design various liquid dosage forms and semi-solid dosage forms. <b>CO.5.</b> Estimate the ingredients calculation for preparation of dosage form						
CO Map	Question No.	Question				Marks
CO1,2,4	Q.1a	Synopsis- Compare percentage of sucrose present in simple syrup IP and simple syrup USP.				2
CO1,2,4	Q.1b	Synopsis- Enlist the use of Iodine Throat Paint.				2
CO1,2,4	Q.1c	Synopsis- Why potassium iodide is used in the preparation of Lugol's solution.				2
CO1,2,4	Q.1d	Synopsis- List the two differences between Lotion and Liniments.				2
CO1,2,4	Q.1e	Synopsis- What are the disadvantages of solid dosage forms?				2
CO1,2, 4,5	Q.2	Experiment To Prepare and submit 10 ml Lugol's solution.				25
CO1,2,3,4,5	Q.3	Viva				5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2



<b>Level</b>	3	IF 80% of students secure more than 60% marks then level 3
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**Attainment Level:**

93.61 % Percentage of students secured more than 60% marks, so this course PHARMACEUTICS- PRACTICAL (BP109T) has attained Level 3.

*H. H. H. H.*



DIRECTOR  
&  
PRINCIPAL



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# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### Programme Outcomes:

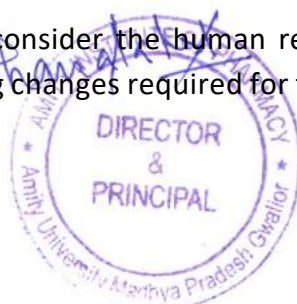
**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and



societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “-”



**PROGRAMME ARTICULATION  
MATRIX**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
ISEM	BP110P	2	3	3	1	1	2		3		1	2					
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

*A. H. H.*  




# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

<b>DEPARTMENT OF PHARMACEUTICAL CHEMISTRY</b>
<b>Course Handout</b>
Course : PHARMACEUTICAL INORGANIC CHEMISTRY (Practical)
Course Code : BP110P, Crédits : 02, Session :2023-24 (Odd Sem.), Class : B.Pharm. 1st Year
Faculty Name: Mr. Hero Khan Pathan

**A. Introduction:** This subject deals with the monographs of inorganic drugs and pharmaceuticals.

**B. Course Outcomes:** At the end of the course, students will be able to:

**BP110P.1.** To recognize various sources of impurities and carry out limit test of ions in inorganic compounds.

**BP110P.2.** Describe the effects of impurities in pharmacopoeial substances.

**BP110P.3.** Perform the identification test of various inorganic compounds as per Indian pharmacopeia.

**BP110P.4.** Carry out the test for purity of inorganic compounds.

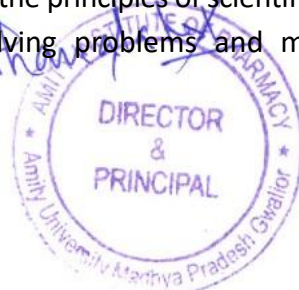
**BP110P.5.** Prepare various inorganic pharmaceuticals preparation.

**C. Programme Outcomes:**

**[PO.1].Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2].Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily



practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

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**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**D. Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
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Continuous Internal Evaluation	Mid Term 1	CT	10%
	Mid Term 2		
	Lab record	LR	1%
	Viva	V	2%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	2%
End Semester Examination	End Semester Examination	EE	35%
<b>Total</b>			<b>50%</b>

#### E. Syllabus;

- I Limit tests for following ions:** Limit test for Chlorides and Sulphates; Modified limit test for Chlorides and Sulphates; Limit test for Iron ;Limit test for Heavy metals; Limit test for Lead ;Limit test for Arsenic.
- II Identification test:** Magnesium hydroxide; ferrous sulphate; Sodium bicarbonate; Calcium gluconate; Copper sulphate.
- III Test for purity:** Swelling power of Bentonite; Neutralizing capacity of aluminum hydroxide gel; Determination of potassium iodate and iodine in potassium Iodide.
- IV Preparation of inorganic pharmaceuticals:** Boric acid Potash alum ferrous sulphate

#### F. Examination Scheme:

Components	A	CT	LR	V	EE
Weightage (%)	2	10	1	2	35

CT: Class Test, LR: Lab Record, V: Viva, EE: End Semester Examination; A: Attendance

#### G. Suggested Text/Reference Books:

1. A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London, 4 th edition.
2. A.I. Vogel, Text Book of Quantitative Inorganic analysis
3. P. Gundu Rao, Inorganic Pharmaceutical Chemistry, 3 rd Edition
4. M.L Schroff, Inorganic Pharmaceutical Chemistry
5. Bentley and Driver's Textbook of Pharmaceutical Chemistry
6. Anand & Chatwal, Inorganic Pharmaceutical Chemistry
7. Indian Pharmacopoeia

#### H. Lecture Plan



Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	To perform limit test for chloride in given sample.	Practical	CO1, 2, 4	Mid Term-1, Quiz & End Sem Exam
2	To perform limit test for sulphate in given sample.	Practical	CO1, 2, 4	Mid Term-1, Quiz & End Sem Exam
3	To perform limit test for iron in given sample.	Practical	CO1, 2, 4	Mid Term-1, Quiz & End Sem Exam
4	To perform identification test for boric acid.	Practical	CO1,3, 4,	Mid Term-1, Quiz & End Sem Exam
5	To perform the identification test of ammonium chloride.	Practical	CO1, 3, 4,	Mid Term-1, Quiz & End Sem Exam
6	To identify cation & anion in given pharmaceutical compounds.	Practical	CO1,3, 4,	Mid Term-1, Quiz & End Sem Exam
7	To prepare and submit aluminum hydroxide.	Practical	CO1, 4,5,	Mid Term-2, Quiz & End Sem Exam
8	To prepare and submit Boric acid (H <sub>3</sub> BO <sub>3</sub> )	Practical	CO1, 4,5,	Mid Term-2, Quiz & End Sem Exam
9	To prepare and submit Potash alum (K <sub>2</sub> SO <sub>4</sub> . Al <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub> .24 H <sub>2</sub> O)	Practical	CO1, 4,5,	Mid Term-2, Quiz & End Sem Exam
10	To prepare and submit Zinc sulphate (ZnSO <sub>4</sub> ).	Practical	CO1, 4,5,	Mid Term-2, Quiz & End Sem Exam
11	To prepare and submit magnesium carbonate (MgCO <sub>3</sub> )	Practical	CO1,4, 5,	Mid Term-2, Quiz & End Sem Exam
12	To prepare and submit calcium carbonate (CaCO <sub>3</sub> ).	Practical	CO1, 4,5,	Mid Term-2, Quiz & End Sem Exam

### I. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES										
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11





<b>BP110P.1</b>	To recognize various sources of impurities and carry out limit test of ions in inorganic compounds.	3	-	2	1	2	1	-	2	1	2	1	
<b>BP110P.2.</b>	Describe the effects of impurities in pharmacopoeial substances.	2	-	-	1	-	1	-	-	-	-	3	
<b>BP110P.3.</b>	Perform the identification test of various inorganic compounds as per Indian pharmacopeia.	3	2	2	1	-	2	-	2	-	-	3	
<b>BP110P.4.</b>	Carry out the test for purity of inorganic compounds.	2	2	2	1	-	2	-	2	-	-	3	
<b>BP110P.5.</b>	Prepare various inorganic pharmaceuticals preparation.	1	2	3	-	-	2	-	2	-	-	3	

### Sample Question Paper

Amity Institute of Pharmacy  
Department of Pharmaceutical Chemistry  
IMID-SEMESTER(SEM-Ist)2023-24



Class: B.Pharm, I Semester						
SubjectName: BP110P Pharmaceutical inorganic chemistry -I Practical		Time:4 Hrs			Max.Marks:40	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4,5	Q.4	Q.2,3,5	Q.2,3,5		
Student will be able to  <b>CO.1.</b> To recall different chemical methods to prepare inorganic pharmaceuticals. <b>CO.2.</b> To Perform identification tests as per Indian Pharmacopoeia. <b>CO.3.</b> Determine the impurities qualitatively by performing tests for purity <b>CO.4.</b> Understand the medicinal and pharmaceutical importance of inorganic compounds <b>CO.5.</b> Adjudge the level of specific impurities in the given inorganic compounds by performing different limit tests.						
COMap	Question No.	Question				Marks
CO1,2,4	Q.1a	Synopsis- Write the molecular formula and uses of Potash Alum.				2
CO1,2,4	Q.1b	Synopsis- Why nitric acid is used in the limit test for chloride.				2
CO1,2,4	Q.1c	Synopsis- Writes the principle of the limit test of iron.				2
CO 3, 5	Q.1d	Synopsis- Which color is obtained in the limit test for Arsenic.				2
CO 3, 5	Q.1e	Synopsis- write the molecular formula and uses of boric acid				2
CO1,2, 4,5	Q.2	Experiment To demonstrate the limit test for sulphate in the given sample.				25
CO1,2,3,4,5	Q.3	Viva				5



Attainments		Rubric
Level	1	If 60% of students secure more than 60% marks then level 1
Level	2	If 70% of students secure more than 60% marks then level 2
Level	3	If 80% of students secure more than 60% marks then level 3

**Attainment Level 3:**

95.7 % of students secured more than 60% marks, so this course Pharmaceutical Inorganic Chemistry Practical (BP110P) attainment is level 3.





# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICS

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### Programme Outcomes:

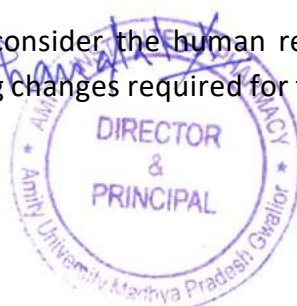
**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and



societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “- “



**PROGRAMME ARTICULATION  
MATRIX**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
I SE M																	
	BP111P	1	1	3	1	1	3	1	1	2	3	3					




## DEPARTMENT OF PHARMACOLOGY

### Course Handout

Course : Communication Skills- Practicals

Course Code : BP111P, Crédits : 01, Session :2023-24 (Odd Sem.), Class : B.Pharm. 1st Year

Faculty Name: Dr. Sonia Shrivastava

- A. Introduction:** The course is designed to impart knowledge about basic communication.
- B. Course Outcomes:** At the end of the course, students will be able to:
- BP111P: 1.** Practice different types of skills such as presentation skills, communications skills, and listening skills.
- BP111P: 2.** Practice of basic communication.
- BP111P: 3.** Interview handling skills.
- BP111P: 4.** Practice of **pronunciations**.
- BP111P: 5.** Communicate effectively (Verbal and Non Verbal)
- C. Programme Outcomes:**
- [PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
- [PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
- [PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
- [PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
- [PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.



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#### D. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	5%
	Mid Term 2		
	Lab record	LR	1%
	Viva	V	2%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	2%
End Semester Examination	End Semester Examination	EE	15%
<b>Total</b>			<b>25%</b>

#### E. Syllabus

##### Basic communication covering the following topics

Meeting People

Asking Questions

Making Friends





What did you do?

Do's and Dont's

### **Pronunciations covering the following topics**

Pronunciation (Consonant Sounds)

Pronunciation and Nouns

Pronunciation (Vowel Sounds)

### **Advanced Learning**

Listening Comprehension / Direct and Indirect Speech

Figures of Speech

Effective Communication

Writing Skills

Effective Writing

Interview Handling Skills

E-Mail etiquette

Presentation Skills

### **F. Examination Scheme:**

Components	A	CT	LR	V	EE
Weightage (%)	2	5	1	2	15

CT: Class Test, LR: Lab Record, V: Viva, EE: End Semester Examination; A: Attendance

### **G. Suggested Text/Reference Books:**

1. Basic communication skills for Technology, Andreja. J. Ruther Ford, 2nd Edition, Pearson Education, 2011
2. Communication skills, Sanjay Kumar, Pushpalata, 1stEdition, Oxford Press, 2011
3. Organizational Behaviour, Stephen .P. Robbins, 1stEdition, Pearson, 2013
4. Brilliant- Communication skills, Gill Hasson, 1stEdition, Pearson Life, 2011
5. The Ace of Soft Skills: Attitude, Communication and Etiquette for success, Gopala Swamy Ramesh, 5thEdition, Pearson, 2013
6. Developing your influencing skills, Deborah Dalley, Lois Burton, Margaret, Green hall, 1st Edition Universe of Learning LTD, 2010
7. Communication skills for professionals, Konar nira, 2ndEdition, New arrivals – PHI, 2011
8. Personality development and soft skills, Barun K Mitra, 1stEdition, Oxford Press, 2011
9. Soft skill for everyone, Butter Field, 1st Edition, Cengage Learning india pvt.ltd,

### **H. Lecture Plan**

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Meeting People, Asking Questions, Making Friends What did you do?	Practical	CO1	Mid Term-1, Quiz & End Sem Exam
2	Pronunciation (Consonant Sounds) Pronunciation and Nouns Pronunciation (Vowel Sounds)	Practical	CO1	Mid Term-1, Quiz & End Sem Exam



3	Pronunciation (Consonant Sounds) Pronunciation and Nouns Pronunciation (Vowel Sounds)	Practical	CO1	Mid Term-1, Quiz & End Sem Exam
4	Listening Comprehension / Direct and Indirect Speech	Practical	CO1	Mid Term-1, Quiz & End Sem Exam
5	Figures of Speech	Practical	CO2	Mid Term-1, Quiz & End Sem Exam
6	Effective Communication	Practical	CO3	Mid Term-1, Quiz & End Sem Exam
7	Writing Skills Effective Writing	Practical	CO4	Mid Term-2, Quiz & End Sem Exam
8	Interview Handling Skills	Practical	CO3,5	Mid Term-2, Quiz & End Sem Exam
9	Interview Handling Skills	Practical	CO6	Mid Term-2, Quiz & End Sem Exam
10	Interview Handling Skills	Practical	CO4	Mid Term-2, Quiz & End Sem Exam
11	E-Mail etiquette	Practical	CO3	Mid Term-2, Quiz & End Sem Exam
12	Presentation Skills	Practical	CO1	Mid Term-2, Quiz & End Sem Exam

#### A. Course Articulation Matrix (Mapping of COs with POs)

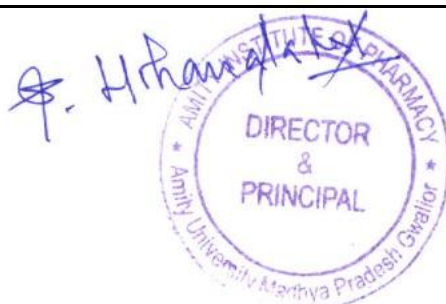
CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES										
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	PO 10	PO 11
<b>BP111P: 1.</b>	<b>BP111P: 1.</b> Practice different types of skills such as presentation skills, communications skills, and listening skills.	2	2	2	3	2	1	1	3	1	2	3
<b>BP111P: 2.</b>	<b>BP111P: 2.</b> Practice of basic communication	2	1	3	2	1	1	1	3	1	3	2
<b>BP111P: 3.</b>	<b>BP111P: 3.</b> Interview handling skills.	2	2	2	2	1	2	-	3	-	3	2
<b>BP111P: 4.</b>	<b>BP111P: 4.</b> Practice of pronunciations.	2	2	2	3	1	2	1	3	1	2	2



<b>BP111P: 5.</b>	<b>BP111P: 5.</b> Communicate effectively (Verbal and Non Verbal)	2	2	2	3	1	2	-	3	-	3	3	
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**Sample Question Paper**

Amity Institute of Pharmacy Department of Pharmaceutics I MID-SEMESTER (SEM –Ist) 2022-23						
Class: B.Pharm, I Semester						
Subject Name: Communication Skills-Practical (BP111P)		Time: 2 Hrs			Max. Marks: 40	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1a,b,c,d,e	Q.3	Q.3	Q.2,5,6	Q.3	Q.2
Student will be able to <b>BP111P: 1.</b> Practice different types of skills such as presentation skills, communications skills, and listening skills. <b>BP111P: 2.</b> Practice of basic communication. <b>BP111P: 3.</b> Interview handling skills. <b>BP111P: 4.</b> Practice of <b>pronunciations</b> .						
CO Map	Question No.	Question				Marks
CO1	Q.1a	Synopsis- Demonstrate effective verbal communication.				2
CO1	Q.1b	Synopsis- What are the different forms of communication?				2
CO2	Q.1c	Synopsis- What are the best practices for an interview?				2
CO3	Q.1d	Synopsis- Explain the concept of group discussion.				2
CO3	Q.1e	Synopsis- What are listening abilities?				2
CO4	Q.2	Experiment Engage in a practice interview.				25
CO1,2,3,4	Q.3	Viva				5



Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

### Attainment Level 3:

96.8 % of students secured more than 60% marks, so this course Communication Skill Practical (BP111P) attainment is level 3.



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# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACOLOGY

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

#### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### Programme Outcomes:

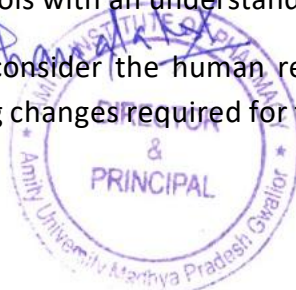
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1: Slight (Low), 2: Moderate (Medium) and 3: Substantial (High)



PROGRAMME ARTICULATION MATRIX																	
		PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
I SEM																	
		BP112RBP	3	2	1	2	-	-	1	1	-	-	3	-	-	1	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

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DIRECTOR & PRINCIPAL

AMI INSTITUTE OF PHARMACY  
Amity University, Madhya Pradesh, Gwalior





## DEPARTMENT OF PHARMACOLOGY

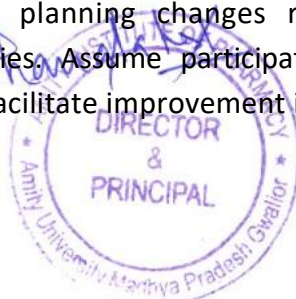
### Course Handout

Course : REMEDIAL BIOLOGY- PRACTICAL

Course Code : BP112RBP, Credits : 01, Session :2023-24 (Odd Sem.), Class : B.Pharm. 1st Year

Faculty Name : Ms. NEETHU M V

- A. Introduction:** The course is designed to introduces essential lab techniques such as microscope use, slide preparation, and tissue examination. Students will study plant structures, perform virtual dissections, and conduct tests like blood group identification and blood pressure measurement, offering a hands-on approach to understanding biological systems.
- B. Course Outcomes:** At the end of the course, students will be able to:
- CO.1** Identify and operate basic biological equipment, such as microscopes, and accurately prepare and analyze biological specimens using section cutting and staining techniques.
  - CO.2** Understand and explain the structure and function of plant organs, including stems, roots, leaves, and flowers, along with their modifications.
  - CO.3.** Apply practical skills in determining blood groups, measuring blood pressure, and analyzing lung function through hands-on experimentation.
  - CO.4.** Analyze and differentiate microscopic tissues from plant parts (stem, root, leaf, flower) and understand their role in plant physiology.
  - CO.5.** Evaluate biological systems through virtual dissection and comparative anatomy, gaining insights into organism structure and function.
- C. Programme Outcomes:**
- [PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
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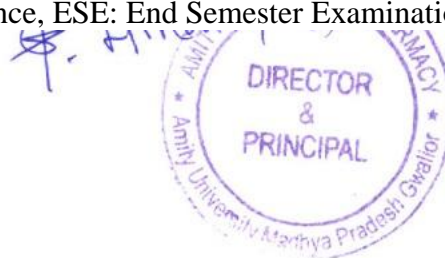
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**D. Assessment Plan:**

		Description	Code	Weightage %
<b>Internal Assessment (15%)</b>	Sessional Examination		SE	10%
	<b>Continuous Mode (5%)</b>	Practical Record	PR	1%
		Viva-voice	V	2%
		Attendance 95% – 100% = 2 90% – 94% = 1.5 85% – 89% = 1 80% – 84% = 0.5 Less than 80 = 0  A candidate is required to put in at least 80% attendance in individual courses considering theory and practical separately. The candidates securing less than 80% attendance are not eligible to appear for the respective examinations.	AT	2%
		End Semester Examination	ESE	35%
<b>Total</b>			<b>50%</b>	

**Abbreviations:** SE: Sessional Examination, PR: Practical Record, V: Viva-voice, AT: Attendance, ESE: End Semester Examination



## E. Syllabus

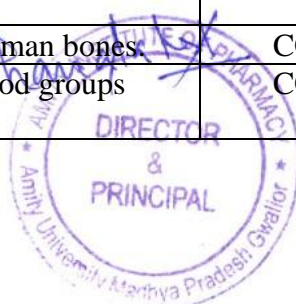
1. Introduction to experiments in biology: a) Study of Microscope, b) Section cutting techniques, c) Mounting and staining, d) Permanent slide preparation
2. Study of cell and its inclusions
3. Study of Stem, Root, Leaf, seed, fruit, flower and their modifications
4. Detailed study of frog by using computer models
5. Microscopic study and identification of tissues pertinent to Stem, Root, Leaf, seed, fruit and flower
6. Identification of bones
7. Determination of blood group
8. Determination of blood pressure
9. Determination of tidal volume

## F. Reference Books

1. Practical human anatomy and physiology. by S.R.Kale and R.R.Kale.
2. A Manual of pharmaceutical biology practical by S.B.Gokhale, C.K.Kokate and S.P.Shriwastava.
3. Biology practical manual according to National core curriculum. Biology forum of Karnataka. Prof .M.J.H.Shafi

## G. Lab Plan

Lab session	Topics	Corresponding CO	Mode of Assessing CO
1	To familiarize with the parts and operation of a microscope.	CO 1, 2, 3, 5	Sessional Exam/ Attendance/ Practical Record/Viva/ End-Sem Examination
2	To learn how to prepare thin sections of plant and animal tissues.	CO1, 2, 3, 5	
3	To learn how to mount and stain slides for microscopic observation.	CO 1, 2, 3, 5	
4	To learn the techniques for preparing permanent slides.	CO1, 5	
5	To observe and identify different types of cells and tissues.	CO1, 2, 3, 5	
6	To observe and identify different types of tissues.	CO 1, 2, 3, 5	
7	To study the external and internal structures of plant organs.	CO 1, 2, 3, 5	
8	To understand the anatomy of a frog through virtual dissection.	CO 1, 2, 3, 5	
9	To learn to identify various human bones.	CO 2, 5	
10	To learn how to determine blood groups using the ABO system.	CO 4, 5	



11	To learn how to measure blood pressure manually.	CO 4, 5
12	To understand and measure the tidal volume of the lungs.	CO 4, 5
13	To observe and understand the stages of cell division.	CO 1, 2, 3, 5
14	To conduct experiments to understand plant physiological processes.	CO 2, 3, 5
15	To conduct experiments to understand animal physiological processes.	CO 2, 4, 5

#### H. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES											CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		P C 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
<b>CO.1</b>	<b>1.</b> Identify and operate basic biological equipment, such as microscopes, and accurately prepare and analyze biological specimens using section cutting and staining techniques.	3	-	1	-	1	-	-	1	-	1	1	-	1	-	3
<b>CO.2.</b>	<b>2.</b> Understand and explain the structure and function of plant organs, including stems, roots, leaves, and flowers, along with their modifications	2	1	-	-	-	-	-	1	-	-	3	-	1	-	2
<b>CO.3.</b>	<b>Apply</b> practical skills in determining blood groups, measuring blood pressure, and analyzing lung function through hands-on experimentation	3	3	2	3	-	-	1	1	-	-	3	-	1	-	3

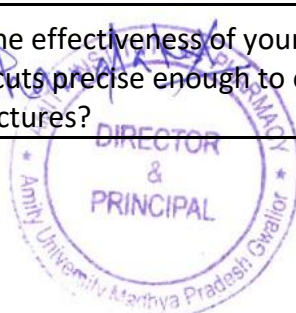
  


<b>CO.4.</b>	<b>4.</b> Analyze and differentiate microscopic tissues from plant parts (stem, root, leaf, flower) and understand their role in plant physiology	2	2	2	1	-	-	3	1	1	-	3	-	1	-	2
<b>CO.5.</b>	<b>5.</b> Evaluate biological systems through virtual dissection and comparative anatomy, gaining insights into organism structure and function	3	3	3	1	-	-	1	1	-	-	3	-	1	-	3


  
 Director & Principal

## I. Sample Question Paper

Amity Institute of Pharmacy Department of Pharmacology I MID-SEMESTER (SEM –I <sup>st</sup> ) 2023-24					
Class: B.Pharm, I Semester					
Subject Name: BP112RBP REMEDIAL BIOLOGY PRACTICAL.		Time: 4 Hrs		Max. Marks: 40	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating
	1,7	2,7	3,7	4,5,6,7	5,6,7
The student will be able to <b>CO.1</b> Identify and operate basic biological equipment, such as microscopes, and accurately prepare and analyze biological specimens using section cutting and staining techniques. <b>CO.2</b> Understand and explain the structure and function of plant organs, including stems, roots, leaves, and flowers, along with their modifications. <b>CO.3.</b> Apply practical skills in determining blood groups, measuring blood pressure, and analyzing lung function through hands-on experimentation. <b>CO.4.</b> Analyze and differentiate microscopic tissues from plant parts (stem, root, leaf, flower) and understand their role in plant physiology. <b>CO.5.</b> Evaluate biological systems through virtual dissection and comparative anatomy, gaining insights into organism structure and function.					
CO Map	Question No.	Question			Marks
CO1	1	What are the main parts of a light microscope?			2
CO2	2	Explain why thin sections are necessary for microscope observation			2
CO3	3	How would you identify a femur bone from other bones?			2
CO4	4	Analyze factors that affect blood pressure, such as stress and diet			2
CO2	5	Explain the significance of tidal volume in respiratory health			2
CO5	5	Evaluate the effectiveness of your section cutting. Were the cuts precise enough to observe detailed tissue structures?			15



CO4,5	6	Evaluate the importance of determining blood groups before blood transfusions. How can incorrect blood typing lead to complications?	10
CO1,2,3,4,5	7	VIVA	5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**Attainment Level:**

85.71 % Percentage of students secured more than 60% marks, so this course REMEDIAL BIOLOGY PRACTICAL(BP112P) attained Level 3.

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AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACOLOGY

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

### Programme Outcomes:

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

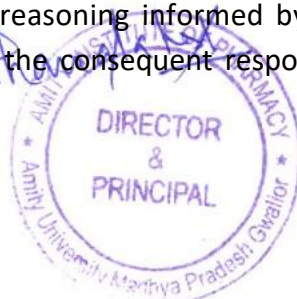
**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.



**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “- “

PROGRAMME ARTICULATION MATRIX																
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
II SEM	BP201T	3	2	2	1	1	3	2	1	1	1	3				

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# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

<b>DEPARTMENT OF PHARMACOLOGY</b>
<b>Course Handout</b>
Course : HUMAN ANATOMY AND PHYSIOLOGY – II THEORY
Course Code : BP201T, Crédits : 04, Session :2023-24 (Even Sem.), Class : B.Pharm. Ist Year
Faculty Name: Dr. P. Sagar / Mr. Arvind Singh Jadon

**A. Introduction:** This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms.

**B. Course Outcomes:** At the end of the course, students will be able to:

**BP201T.1.** Explain the gross morphology, structure and functions of various organs of the human body.

**BP201T.2.** Describe the various homeostatic mechanisms and their imbalances.

**BP201T.3.** Identify the various tissues and organs of different systems of human body.

**BP201T.4.** Perform the hematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume.

**BP201T.5.** Appreciate coordinated working pattern of different organs of each system

**C. Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.



**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

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**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.



#### D. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	3%
	Student – Teacher interaction	S-T I	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

#### E. Syllabus

##### Unit I

##### ☐ Nervous system

Organization of nervous system, neuron, neuroglia, classification and properties of nerve fibre, electrophysiology, action potential, nerve impulse, receptors, synapse, neurotransmitters.

Central nervous system: Meninges, ventricles of brain and cerebrospinal fluid. structure and functions of brain (cerebrum, brain stem, cerebellum), spinal cord (gross structure, functions of afferent and efferent nerve tracts, reflex activity)

##### Unit II

##### ☐ Digestive system

Anatomy of GI Tract with special reference to anatomy and functions of stomach, Acid production in the stomach, regulation of acid production through parasympathetic nervous system, pepsin role in protein digestion) small intestine and large intestine, anatomy and functions of salivary glands, pancreas and liver, movements of GIT, digestion and absorption of nutrients and disorders of GIT.

##### ☐ Energetics

Formation and role of ATP, Creatinine Phosphate and BMR.

##### Unit III

##### ☐ Respiratory system



Anatomy of respiratory system with special reference to anatomy of lungs, mechanism of respiration, regulation of respiration Lung Volumes and capacities transport of respiratory gases, artificial respiration, and resuscitation methods.

**☒ Urinary system**

Anatomy of urinary tract with special reference to anatomy of kidney and nephrons, functions of kidney and urinary tract, physiology of urine formation, micturition reflex and role of kidneys in acid base balance, role of RAS in kidney and disorders of kidney.

**Unit IV**

**☒ Endocrine system**

Classification of hormones, mechanism of hormone action, structure and functions of pituitary gland, thyroid gland, parathyroid gland, adrenal gland, pancreas, pineal gland, thymus and their disorders.

**Unit V**

**☒ Reproductive system**

Anatomy of male and female reproductive system, Functions of male and female reproductive system, sex hormones, physiology of menstruation, fertilization, spermatogenesis, oogenesis, pregnancy and parturition

**☒ Introduction to genetics**

Chromosomes, genes and DNA, protein synthesis, genetic pattern of inheritance

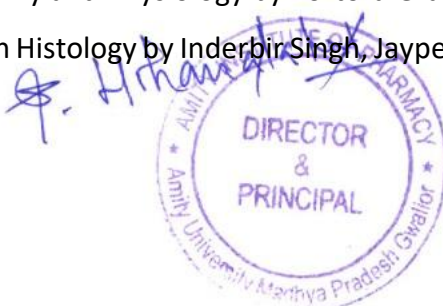
**F. Examination Scheme:**

Components	A	CT	S/V/Q/HA	STI	EE
Weightage (%)	4	15	3	3	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination; A: Attendance

**G. Suggested Text/Reference Books:**

1. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brothers medical publishers, New Delhi.
2. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
3. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co,Riverview,MI USA
4. Text book of Medical Physiology- Arthur C,Guyton andJohn.E. Hall. Miamisburg, OH, U.S.A.
5. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.
6. Textbook of Human Histology by Inderbir Singh, Jaypee brothers medical publishers, New Delhi.



7. Textbook of Practical Physiology by C.L. Ghai, Jaypee brothers medical publishers, New Delhi.

8. Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother's medical publishers, New Delhi.

#### H. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Organization of nervous system	Lecture	1	Mid Term-1, Quiz & End Sem Exam
2	neuron, neuroglia, classification and properties of nerve fibre,	Lecture	1	Mid Term-1, Quiz & End Sem Exam
3	electrophysiology, action potential,	Lecture	1	Mid Term-1, Quiz & End Sem Exam
4	nerve impulse, receptors, synapse, neurotransmitters.	Tutorial	1	Mid Term-1, Quiz & End Sem Exam
5	Central nervous system: Meninges, ventricles of brain	Lecture	1	Mid Term-1, Quiz & End Sem Exam
6	cerebrospinal fluid. structure and functions of brain	Lecture	1,4	Mid Term-1, Quiz & End Sem Exam
7	structure and functions of cerebrum,	Lecture	1	Mid Term-1, Quiz & End Sem Exam
8	structure and functions of brain stem, cerebellum	Lecture	1	Mid Term-1, Quiz & End Sem Exam
9	spinal cord: gross structure,	Lecture	4	Mid Term-1, Quiz & End Sem Exam
10	functions of afferent and efferent nerve tracts, reflex activity	Lecture	4	Mid Term-1, Quiz & End Sem Exam
11	Unit-1	Tutorial		Mid Term-1, Quiz & End Sem Exam



12	Anatomy of GI Tract with special reference to anatomy and functions of stomach	Lecture	1	Mid Term-1, Quiz & End Sem Exam
13	Acid production in the stomach, regulation of acid production through parasympathetic nervous system,	Lecture	5	Mid Term-1, Quiz & End Sem Exam
14	pepsin role in protein digestion small intestine and large intestine,	Lecture	5	Mid Term-1, Quiz & End Sem Exam
15	anatomy and functions of salivary glands, pancreas and liver,	Lecture	5	Mid Term-1, Quiz & End Sem Exam
16	movements of GIT, digestion and absorption of nutrients and disorders of GIT.	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
17	Formation and role of ATP, Creatinine Phosphate and BMR.	Lecture	1	Mid Term-1, Quiz & End Sem Exam
18	Unit-2	Tutorial		Mid Term-1, Quiz & End Sem Exam
19	Anatomy of respiratory system with special reference to anatomy of lungs	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
20	mechanism of respiration,	Lecture		Mid Term-1, Quiz & End Sem Exam
21	regulation of respiration Lung Volumes and capacities	Lecture	1	Mid Term-1, Quiz & End Sem Exam
22	transport of respiratory gases,	Lecture	4	Mid Term-1, Quiz & End Sem Exam
23	artificial respiration, and resuscitation methods.	Lecture	4	Mid Term-1, Quiz & End Sem Exam
24	Anatomy of urinary tract with special reference to anatomy of kidney and nephrons	Lecture	1	Mid Term-1, Quiz & End Sem Exam
25	functions of kidney and urinary tract,	Lecture	4	Mid Term-1, Quiz & End Sem Exam





26	physiology of urine formation,	Lecture	1	Mid Term-1, Quiz & End Sem Exam
27	micturition reflex and role of kidneys in acid base balance,	Lecture	1	Mid Term-1, Quiz & End Sem Exam
28	role of RAS in kidney and disorders of kidney.	Lecture	4	Mid Term-1, Quiz & End Sem Exam
29	Unit 3	Tutorial		Mid Term-1, Quiz & End Sem Exam
30	Classification of hormones,	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
31	mechanism of hormone action,	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
32	structure and functions of pituitary gland,	Lecture	1	Mid Term-2, Quiz & End Sem Exam
33	structure and functions of thyroid gland,	Lecture	1,4	Mid Term-2, Quiz & End Sem Exam
34	structure and functions of parathyroid gland,	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
35	Structure and functions of Adrenal gland,	Lecture	4	Mid Term-2, Quiz & End Sem Exam
36	Structure and functions of pancreas, pineal gland,	Lecture	1	Mid Term-2, Quiz & End Sem Exam
37	Structure and functions of thymus and their disorders.	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
38	Anatomy of male and female reproductive system	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
39	Functions of male and female reproductive system,	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
40	sex hormones	Lecture	1	Mid Term-2, Quiz & End Sem Exam



41	physiology of menstruation, fertilization,	Lecture	4	Mid Term-2, Quiz & End Sem Exam
42	spermatogenesis, oogenesis,	Lecture	5,45	Mid Term-2, Quiz & End Sem Exam
43	pregnancy and parturition,	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
44	Chromosomes, genes and DNA,	Lecture	4	Mid Term-2, Quiz & End Sem Exam
45	protein synthesis, genetic pattern of inheritance	Lecture	1,4	Mid Term-2, Quiz & End Sem Exam

### I. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES											CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 1	PO 2	PO 3
<b>BP201T.1</b>	Explain the gross morphology, structure and functions of various organs of the human body.	3	1	1	1	2	3	1	1	1	1	3				
<b>BP201T.2</b>	Describe the various homeostatic mechanisms and their imbalances.	2	1	2	1	2	2	1	1	1	1	3				
<b>BP201T.3</b>	Identify the various tissues and organs of different systems of human body.	2	1	1	1	2	3	1	1	1	1	3				



<b>BP201T.4</b>	Perform the hematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume.	2	1	1	1	2	3	1	1	1	1	3				
<b>BP201T.5</b>	Appreciate coordinated working pattern of different organs of each system	3	1	2	1	2	3	1	1	1	1	3				

### Sample Question Paper

Amity Institute of Pharmacy Department of Pharmacology I MID-SEMESTER (SEM –II) 2022-23						
Class: B. Pharm, II Semester						
Subject Name: BP201T Human Anatomy and Physiology-II Theory		Time: 1 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q. 1, 2, 3	Q. 4, 7, 8, 9, 10	Q. 5, 6			
<p>The student will be able to</p> <p><b>CO.1.</b> Explain the gross morphology, structure and functions of various organs of the human body.</p> <p><b>CO.2.</b> Describe the various homeostatic mechanisms and their imbalances.</p> <p><b>CO.3.</b> Identify the various tissues and organs of different systems of human body.</p> <p><b>CO.4.</b> Perform the hematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume.</p>						
CO Map	Question No.	Question				Marks
CO1	Q.1	Define action potential.				2
CO1	Q.2	Name the lobes of the cerebrum.				2



CO1	Q.3	Write any two functions of the cerebellum.	2
CO2	Q.4	Enlist the composition of gastric juice?	2
CO2	Q.5	Give a note on ATP's role.	2
CO3	Q.6	Draw a neat, labelled diagram of a neuron and describe its structure and functions.	10
CO2	Q.7	Explain in detail about the metabolism of protein.	10
CO1	Q.8	Describe the types of brain ventricles and give their correlation with CSF.	5
CO2	Q.9	Explain the synapse in detail with a diagram.	5
CO2	Q.10	Enumerate the functions of the liver and pancreas.	5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**Attainments:** Only 51.1 % of students secured more than 60% marks, so this course HUMAN ANATOMY AND PHYSIOLOGY-I THEORY (BP201T) not attained any Level.





AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

**Bachelor of Pharmacy (B. Pharm.), Academic Year – 20223-24**

### Programme Outcomes:

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

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**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

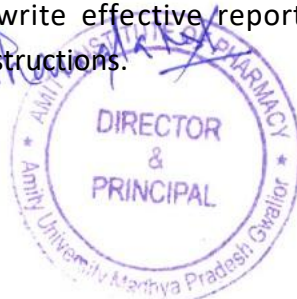
**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

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### **Programme Specific Outcomes:**

**PSO 1:** Will be able to design, develop and implement efficient software for a given real life problem.

**PSO 2:** Will be able to apply knowledge of AI, Machine Learning and Data Mining in analyzing big data for extracting useful information from it and for performing predictive analysis.

**PSO 3:** Will be able to design, manage and secure wired/ wireless computer networks for transfer and sharing of information.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

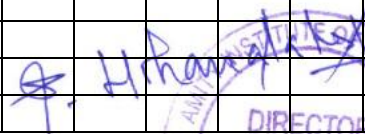
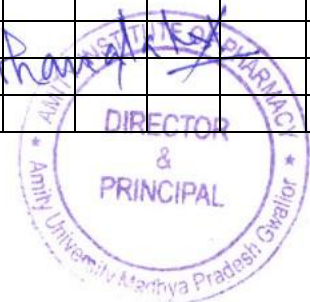
1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “- “



**PROGRAMME ARTICULATION  
MATRIX**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
I SEM																
II SEM	BP202 T	2	-	2	-	1	2	2	1	1	-			-	1	-
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 Bhopal

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*H. H. H.*


  
 AMITY INSTITUTE OF PHARMACY  
 Amity University, Mathya Pradesh, Gwalior  
 DIRECTOR & PRINCIPAL





# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

## DEPARTMENT OF PHARMACEUTICAL SCIENCE

### Course Handout

Course : PHARMACEUTICAL ORGANIC CHEMISTRY – I THEORY

Course Code : BP 202T, Crédits : 04, Session : 2023-24 (Even Sem.), Class : B.Pharm. I st Year

Faculty Name: Dr. Pawan Kumar Gupta

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

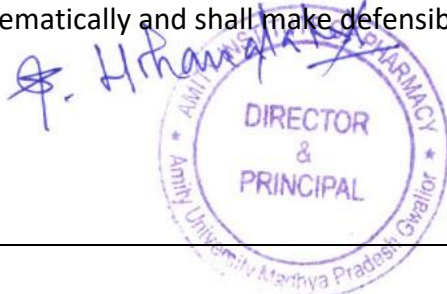
**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world

#### **Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

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*S. H. H. H.*



DIRECTOR  
&  
PRINCIPAL

**Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

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**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “- “



Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
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	Student – Teacher interaction	S-T I	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

## A. Syllabus

### Classification, nomenclature and isomerism

Classification of Organic Compounds

Common and IUPAC systems of nomenclature of organic compounds  
(up to 10 Carbons open chain and carbocyclic compounds)

Structural isomerisms in organic compounds

### Alkanes\*, Alkenes\* and Conjugated dienes\*

SP<sup>3</sup> hybridization in alkanes, Halogenation of alkanes, uses of paraffins.

Stabilities of alkenes, SP<sup>2</sup> hybridization in alkenes

E<sub>1</sub> and E<sub>2</sub> reactions – kinetics, order of reactivity of alkyl halides, rearrangement of carbocations, Saytzeffs orientation and evidences. E<sub>1</sub> versus E<sub>2</sub> reactions, Factors affecting E<sub>1</sub> and E<sub>2</sub> reactions. Ozonolysis, electrophilic addition reactions of alkenes, Markownikoff's orientation, free radical addition reactions of alkenes, Anti Markownikoff's orientation.

Stability of conjugated dienes, Diel-Alder, electrophilic addition, free radical addition reactions of conjugated dienes, allylic rearrangement



### Alkyl halides\*

SN<sub>1</sub> and SN<sub>2</sub> reactions - kinetics, order of reactivity of alkyl halides, stereochemistry and rearrangement of carbocations.

SN<sub>1</sub> versus SN<sub>2</sub> reactions, Factors affecting SN<sub>1</sub> and SN<sub>2</sub> reactions

Structure and uses of ethylchloride, Chloroform, trichloroethylene, tetrachloroethylene, dichloromethane, tetrachloromethane and iodoform.

**Alcohols\***- Qualitative tests, Structure and uses of Ethyl alcohol, Methyl alcohol, chlorobutanol, Cetosteryl alcohol, Benzyl alcohol, Glycerol, Propylene glycol

### Carbonyl compounds\* (Aldehydes and ketones)

Nucleophilic addition, Electromeric effect, aldol condensation, Crossed Aldol condensation, Cannizzaro reaction, Crossed Cannizzaro reaction, Benzoin condensation, Perkin condensation, qualitative tests, Structure and uses of Formaldehyde, Paraldehyde, Acetone, Chloral hydrate, Hexamine, Benzaldehyde, Vanilin, Cinnamaldehyde.

### Carboxylic acids\*

Acidity of carboxylic acids, effect of substituents on acidity, inductive effect and qualitative tests for carboxylic acids, amide and ester

Structure and Uses of Acetic acid, Lactic acid, Tartaric acid, Citric acid, Succinic acid. Oxalic acid, Salicylic acid, Benzoic acid, Benzyl benzoate, Dimethyl phthalate, Methyl salicylate and Acetyl salicylic acid

### Aliphatic amines\* -

Basicity, effect of substituent on Basicity. Qualitative test, Structure and uses of Ethanolamine, Ethylenediamine, Amphetamine

### B. Examination Scheme:

Components	A	CT	S/V/Q/HA	STI	EE
Weightage (%)	4	15	3	3	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination; A: Attendance

### C. Suggested Text/Reference Books:

Organic Chemistry by Morrison and Boyd

Organic Chemistry by I.L. Finar, Volume-I

Textbook of Organic Chemistry by B.S. Bahl & Arun Bahl.

Organic Chemistry by P.L.Soni



Practical Organic Chemistry by Mann and Saunders.

Vogel's text book of Practical Organic Chemistry

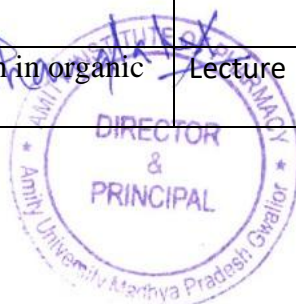
Advanced Practical organic chemistry by N.K.Vishnoi.

Introduction to Organic Laboratory techniques by Pavia, Lampman and Kriz.

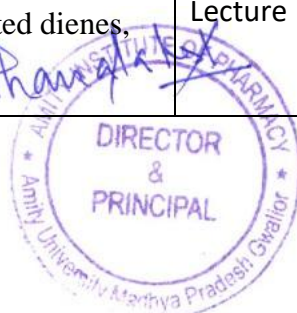
Reaction and reaction mechanism by Ahluwaliah/Chatwal.

### Lecture Plan

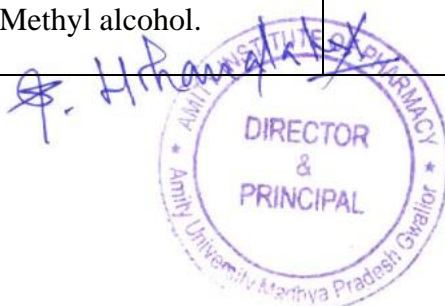
Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Classification of Organic Compounds on the basis of structure.	Lecture	CO1,4	Mid Term-1, Quiz & End Sem Exam
2	Classification of Organic Compounds on the basis of functional group.	Lecture	CO1,4	Mid Term-1, Quiz & End Sem Exam
3	IUPAC systems of nomenclature of Alkanes, Alkenes and Conjugated dienes.	Lecture	CO1,4	Mid Term-1, Quiz & End Sem Exam
4	IUPAC systems of nomenclature of Alkyl halides and alcohol.	Tutorial	CO1,4	Mid Term-1, Quiz & End Sem Exam
5	IUPAC systems of nomenclature of Carbonyl compound (Aldehydes and ketones).	Lecture	CO1,2	Mid Term-1, Quiz & End Sem Exam
6	IUPAC systems of nomenclature of Carboxylic acids.	Lecture	CO1,2	Mid Term-1, Quiz & End Sem Exam
7	IUPAC systems of nomenclature of aliphatic amines.	Lecture	CO1,2	Mid Term-1, Quiz & End Sem Exam
8	Structural isomerism in organic compounds.	Tutorial	CO1,3	Mid Term-1, Quiz & End Sem Exam
9	Structural isomerism in organic compounds.	Lecture	CO1,2	Mid Term-1, Quiz & End Sem Exam



10	Alkanes- method of Preparation, reaction	Lecture	CO1,3	Mid Term-1, Quiz & End Sem Exam
11	Quiz	Lecture	CO1,4	Mid Term-1, Quiz & End Sem Exam
12	SP <sup>3</sup> hybridization in alkanes.	Tutorial	CO1,4	Mid Term-1, Quiz & End Sem Exam
13	Halogenation of alkanes, uses of paraffin.	Lecture	CO1,4	Mid Term-1, Quiz & End Sem Exam
14	Stabilities of alkenes, SP <sup>2</sup> hybridization in alkenes.	Lecture	CO1,4	Mid Term-1, Quiz & End Sem Exam
15	Alkyl halide- method of Preparation, reaction	Lecture	CO1,4	Mid Term-1, Quiz & End Sem Exam
16	Unit test	Tutorial		Mid Term-1, Quiz & End Sem Exam
17	Rearrangement of carbocations.	Lecture	CO1,5	Mid Term-1, Quiz & End Sem Exam
18	Saytzeffs orientation and evidences.	Lecture	CO1,3	Mid Term-1, Quiz & End Sem Exam
19	E <sub>1</sub> verses E <sub>2</sub> reactions, Factors affecting E <sub>1</sub> and E <sub>2</sub> reactions.	Lecture	CO1,3	Mid Term-1, Quiz & End Sem Exam
20	Ozonolysis, electrophilic addition reactions of alkenes.	Tutorial	CO1,4	Mid Term-1, Quiz & End Sem Exam
21	Markownikoff's orientation, Anti Markownikoff's orientation.	Lecture	CO1,4	Mid Term-1, Quiz & End Sem Exam
22	Free radical addition reactions of alkenes,	Lecture	CO1,4	Mid Term-1, Quiz & End Sem Exam
23	Conjugated dienes* method of Preparation and reaction.	Lecture	CO1,4	Mid Term-1, Quiz & End Sem Exam
24	Quiz	Tutorial		Mid Term-1, Quiz & End Sem Exam
25	Stability of conjugated dienes, Diel-Alder.	Lecture	CO1,5	Mid Term-1, Quiz & End Sem Exam

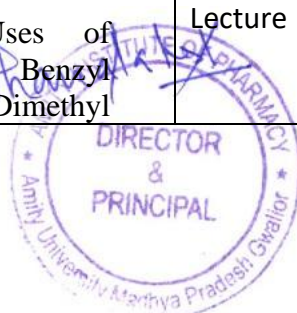


26	Electrophilic addition reaction of dienes.	Lecture	CO1,3	Mid Term-1, Quiz & End Sem Exam
27	Free radical addition reactions of conjugated dienes, allylic rearrangement.	Lecture	CO1,5	Mid Term-1, Quiz & End Sem Exam
28	Method of Preparation and reaction of Alkyl halides. reaction Reaction of aromatic acid	Tutorial	CO1,5	Mid Term-1, Quiz & End Sem Exam
29	SN <sub>1</sub> and SN <sub>2</sub> reactions - kinetics, order of reactivity of alkyl halides.	Lecture	CO1,3	Mid Term-1, Quiz & End Sem Exam
30	SN <sub>1</sub> versus SN <sub>2</sub> reactions, Factors affecting SN <sub>1</sub> and SN <sub>2</sub> reactions.	Lecture	CO1,5	Mid Term-1, Quiz & End Sem Exam
31	Structure and uses of ethylchloride, Chloroform.	Lecture	CO1,2	Mid Term-2, Quiz & End Sem Exam
32	Structure and uses of trichloroethylene, tetrachloroethylene.	Tutorial	CO1,2	Mid Term-2, Quiz & End Sem Exam
33	Structure and uses of dichloromethane, tetrachloromethane and iodoform.	Lecture	CO1,5	Mid Term-2, Quiz & End Sem Exam
34	Alcohols- method of Preparation, reaction.	Lecture	CO1,5	Mid Term-2, Quiz & End Sem Exam
35	Qualitative tests of Alcohols.	Lecture	CO1,5	Mid Term-2, Quiz & End Sem Exam
36	Seminar	Tutorial	CO1,5	Mid Term-2, Quiz & End Sem Exam
37	Structure and uses of Ethyl alcohol, Methyl alcohol.	Lecture	CO1,5	Mid Term-2, Quiz & End Sem Exam





38	Carbonyl compounds (Aldehydes and ketones) method of Preparation, reaction.	Lecture	CO1,5	Mid Term-2, Quiz & End Sem Exam
39	Acidity of carboxylic acids, effect of substituent on acidity.	Lecture	CO1,5	Mid Term-2, Quiz & End Sem Exam
40	Unit test	Tutorial	CO1,5	Mid Term-2, Quiz & End Sem Exam
41	Inductive effect and qualitative tests for carboxylic acids.	Lecture	CO1,5	Mid Term-2, Quiz & End Sem Exam
42	Structure and Uses of Acetic acid, Lactic acid, Tartaric acid.	Lecture	CO1,5	Mid Term-2, Quiz & End Sem Exam
43	Qualitative tests for amide and ester	Lecture	CO1,3	Mid Term-2, Quiz & End Sem Exam
44	Seminar	Tutorial	CO1,3	Mid Term-2, Quiz & End Sem Exam
45	Structure and uses of chlorobutanol, Cetosteryl alcohol, Benzyl alcohol.	Lecture	CO1,4	Mid Term-2, Quiz & End Sem Exam
46	Structure and uses of Glycerol, Propylene glycol.	Lecture	CO1,5	Mid Term-2, Quiz & End Sem Exam
47	Structure and Uses of Acetic acid, Lactic acid, Tartaric acid.	Lecture	CO1,5	Quiz & End Sem Exam
48	Quiz	Tutorial		Quiz & End Sem Exam
49	Structure and Uses of Citric acid, Succinic acid. Oxalic acid, Salicylic acid	Lecture	CO1,5	Quiz & End Sem Exam
50	Structure and Uses of Benzoic acid, Benzyl benzoate, Dimethyl	Lecture	CO1,4	Quiz & End Sem Exam



	phthalate.			
51	Structure and Uses of Methyl salicylate and Acetyl salicylic acid.	Lecture	CO1,4	Quiz & End Sem Exam
52	Aliphatic amines method of Preparation and reaction.	Tutorial	CO1,4	Quiz & End Sem Exam
53	Aliphatic amines method of Preparation and reaction.	Lecture	CO1,4	Quiz & End Sem Exam
54	Basicity, effect of substituent on Basicity.	Lecture	CO1,2	Quiz & End Sem Exam
55	Basicity, effect of substituent on Basicity.	Lecture	CO1,3	Quiz & End Sem Exam
56	Unit test	Tutorial		Quiz & End Sem Exam
57	Aliphatic amines. Qualitative test of amine.	Lecture	CO1,2	Quiz & End Sem Exam
58	Aliphatic amines. Qualitative test of amine.	Lecture	CO1,2	Quiz & End Sem Exam
59	Structure and uses of Ethanolamine, Ethylenediamine, Amphetamine.	Lecture	CO1,2	Quiz & End Sem Exam
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#### D. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
<b>BP202T.1</b>	Relate pharmacy education with pharmacy career options.	2	-	-	-	2	2	1	-	1	-	-	-	1	-	-
<b>BP202T.2.</b>	Classify the different types of <i>organic compounds</i> based on medicinal use.	3	-	-	1	-	2	-	-	-	-	-	3	1	1	-
<b>BP202T.3.</b>	Experiment in the preparation of various types organic compounds and their derivatives.	3	2	-	3	-	2	-	-	-	-	-	3	-	1	-
<b>BP202T.4.</b>	Able to analyse and also to <i>write the structure, name and the type of isomerism of the organic compound.</i>	2	2	3	3	-	1	-	-	-	-	-	3	-	1	-

*A. Hirani*  


BP202T.5.	Able to Solve and write <i>the reaction, name the reaction and also orientation of reactions</i> in different types of <i>organic compounds</i>	1	-	3	-	-	-	-	-	-	-	3	-	1	-
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### Sample Question Paper

Amity Institute of Pharmacy Department of Pharmaceutical Chemistry I MID-SEMESTER (SEM –II nd) 2022-23						
Class: B.Pharm, III Semester						
Subject Name: BP301T Pharmaceutical Organic Chemistry-I Theory		Time: 1 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4,5	Q.2,3,6,8,9	Q.4,7	Q.2,5,		
<p>Student will be able to</p> <p>CO1: Relate pharmacy education with pharmacy career options</p> <p>CO2: Classify the different types of organic compounds based on medicinal use.</p> <p>CO3: Experiment in the preparation of various types of organic compounds and their derivatives.</p> <p>CO4: Able to analyze and to write the structure, name and the type of isomerism of the organic compound.</p> <p>CO5: Able to Solve and write the reaction, name the reaction and orientation of reactions in different types of organic compounds</p>						
CO Map	Question No.	Question				Marks



CO1	Q.1	List down common rules for IUPAC Nomenclature	2
CO1	Q.2	List down three methods of preparation for Alkane with general reaction.	2
CO2	Q.3	Describe Alicyclic Compounds write name and Structure of any three Alicyclic Compounds	2
CO2	Q.4	State Markownikoff's and Anti Markownikoff's rule.	2
CO2 CO2	Q.5	Explain Dienes classifying them with structure.	2
	Q.6	Explain a brief account on various classifications of Organic Compounds	10
CO1	Q.7	Discuss 1,4 cycloaddition reaction of Dienes.	10
CO1	Q.8	Discuss SP <sup>2</sup> hybridization in alkenes.	5
CO2	Q.9	Discuss E1 and E2 reactions with respect to their factors affecting and difference.	5
<b>Attainments</b>		<b>Rubric</b>	
<b>Level</b>	1	IF 60% of students secure more than 60% marks then level 1	
<b>Level</b>	2	IF 70% of students secure more than 60% marks then level 2	
<b>Level</b>	3	IF 80% of students secure more than 60% marks then level 3	

**Attainment Level:**

48.8 % Percentage of students secured more than 60% marks, so this course PHARMACEUTICAL ORGANIC CHEMISTRY I – THEORY (BP202T) not attained any Level.





# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

### Programme Outcomes:

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

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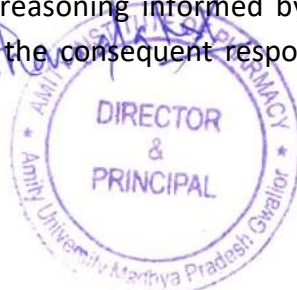
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**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

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PROGRAMME ARTICULATION MATRIX																
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
IIS EM																
	BP-203 T	2	-	3	-	2	1	2	1	1	-	2	-	1	2	-

*S. H. H. H.*  




# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

<b>DEPARTMENT OF PHARMACEUTICAL CHEMISTRY</b>
<b>Course Handout</b>
Course : BIOCHEMISTRY (Theory)
Course Code : BP203T, Crédits : 04, Session :2023-24 (Even Sem.), Class : B.Pharm. 1st Year
Faculty Name: Mr. Hero Khan Pathan

**A. Introduction:** Biochemistry deals with complete understanding of the molecular levels of the chemical process associated with living cells. The scope of the subject is providing biochemical facts and the principles to understand metabolism of nutrient molecules in physiological and pathological conditions. It is also emphasizing on genetic organization of mammalian genome and hetero & autocatalytic functions of DNA

**B. Course Outcomes:** At the end of the course, students will be able to:

**BP203T.1.** Describe the concept of biomolecules and bioenergetics.

**BP203T.2.** Explain the metabolic pathways of biomolecules in both physiological and pathological conditions.

**BP203T.3.** Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.

**BP203T.4.** Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.

**BP203T.5.** Describe the clinical pathology of blood and urine.

**C. Programme Outcomes:**

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**D. Assessment Plan:**



Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva- Voce/Quiz/Home Assignment	S/V/Q/H A	3%
	Student – Teacher interaction	S-T I	3%
Attendance	A minimum of 80% Attendance is required to be maintained by students to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

## E. Syllabus

### UNIT – I

**Biomolecules** Introduction, classification, chemical nature and biological role of carbohydrate, lipids, nucleic acids, amino acids and proteins.

**Bioenergetics** Concept of free energy, endergonic and exergonic reaction, Relationship between free energy, enthalpy and entropy; Redox potential. Energy rich compounds; classification; biological significances of ATP and cyclic AMP

### UNIT – II

**Carbohydrate metabolism:** Glycolysis – Pathway, energetics and significance Citric acid cycle- Pathway, energetics and significance HMP shunt and its significance; Glucose-6-Phosphate dehydrogenase (G6PD) deficiency Glycogen metabolism Pathways and glycogen storage diseases (GSD) Gluconeogenesis- Pathway and its significance Hormonal regulation of blood glucose level and Diabetes mellitus.

### **Biological oxidation:**

Electron transport chain (ETC) and its mechanism. Oxidative phosphorylation & its mechanism and substrate

Phosphorylation Inhibitors ETC and oxidative phosphorylation/Uncouplers level.

### UNIT – III



**Lipid metabolism:**

B-Oxidation of saturated fatty acid (Palmitic acid). Formation and utilization of ketone bodies; ketoacidosis, De novo synthesis of fatty acids (Palmitic acid), Biological significance of cholesterol and conversion of cholesterol into bile acids, steroid hormone and vitamin D, Disorders of lipid metabolism: Hypercholesterolemia, atherosclerosis, fatty liver and obesity.

**Amino acid metabolism**

General reactions of amino acid metabolism: Transamination, deamination & decarboxylation, urea cycle and its disorders Catabolism of phenylalanine and tyrosine and their metabolic disorders (Phenylketonuria, Albinism, alcaptonuria, tyrosinemia) Synthesis and significance of biological substances; 5-HT, melatonin, dopamine, noradrenaline, adrenaline Catabolism of heme; hyperbilirubinemia and jaundice.

**UNIT – IV****Nucleic acid metabolism and genetic information transfer**

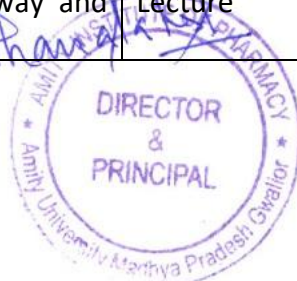
Biosynthesis of purine and pyrimidine nucleotides Catabolism of purine nucleotides and Hyperuricemia and Gout disease Organization of mammalian genome Structure of DNA and RNA and their functions DNA replication (semi conservative model) Transcription or RNA synthesis Genetic code, Translation or Protein synthesis and inhibitors

**UNIV – V****Enzymes:**

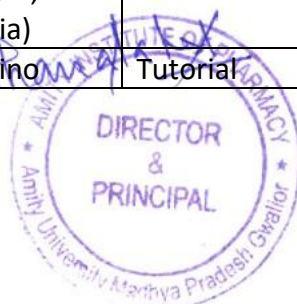
Introduction, properties, nomenclature and IUB classification of enzymes Enzyme kinetics (Michaelis plot, Line Weaver Burke plot) Enzyme inhibitors with examples Regulation of enzymes: enzyme induction and repression, allosteric enzymes regulation Therapeutic and diagnostic applications of enzymes and isoenzymes Coenzymes –Structure and biochemical functions



Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction, classification, chemical nature of biomolecules	Lecture	1	Mid Term-1, Quiz & End Sem Exam
2	biological role of carbohydrate and lipids	Lecture	1	Mid Term-1, Quiz & End Sem Exam
3	Biological role of nucleic acids, amino acids and proteins.	Lecture		Mid Term-1, Quiz & End Sem Exam
4	Revision of biomolecules	Tutorial	1	Mid Term-1, Quiz & End Sem Exam
5	Concept of free energy, endergonic and exergonic reaction,	Lecture	1	Mid Term-1, Quiz & End Sem Exam
6	Relationship between free energy, enthalpy and entropy; Redox potential.	Lecture	1	Mid Term-1, Quiz & End Sem Exam
7	Classification and biological significances of ATP and cyclic AMP	Lecture	1	Mid Term-1, Quiz & End Sem Exam
8	Quiz	Tutorial		Mid Term-1, Quiz & End Sem Exam
9	Introduction of carbohydrate metabolism, Glycolysis – Pathway, energetics and significance	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
10	Pathway, energetics and significance of Citric acid cycle	Lecture	2	Mid Term-1, Quiz & End Sem Exam
11	HMP shunt and its significance; Glucose-6-Phosphate dehydrogenase (G6PD) deficiency	Lecture	2	Mid Term-1, Quiz & End Sem Exam
12	Revision of carbohydrate metabolic pathways.	Tutorial		Mid Term-1, Quiz & End Sem Exam
13	Glycogen metabolism Pathways and glycogen storage diseases (GSD)	Lecture	2	Mid Term-1, Quiz & End Sem Exam
14	Gluconeogenesis- Pathway and its significance	Lecture	2	Mid Term-1, Quiz & End Sem Exam



15	Hormonal regulation of blood glucose level and Diabetes mellitus	Lecture	2	Mid Term-1, Quiz & End Sem Exam
16	Complete discussion of carbohydrate metabolism.	Tutorial		Mid Term-1, Quiz & End Sem Exam
17	Electron transport chain (ETC) and its mechanism	Lecture	1	Mid Term-1, Quiz & End Sem Exam
18	Oxidative phosphorylation & its mechanism and substrate Phosphorylation.	Lecture	1	Mid Term-1, Quiz & End Sem Exam
19	Inhibitors ETC and oxidative phosphorylation/Uncouplers	Lecture	1	Mid Term-1, Quiz & End Sem Exam
20	Group discussion on biological oxidation.	Tutorial		Mid Term-1, Quiz & End Sem Exam
21	$\beta$ -Oxidation of saturated fatty acid (Palmitic acid)	Lecture	2	Mid Term-1, Quiz & End Sem Exam
22	ketoacidosis : Formation and utilization of ketone bodies;	Lecture	2	Mid Term-1, Quiz & End Sem Exam
23	De novo synthesis of fatty acids (Palmitic acid)	Lecture	2	Mid Term-1, Quiz & End Sem Exam
24	Revision of lipid metabolism	Tutorial		Mid Term-1, Quiz & End Sem Exam
25	conversion of cholesterol into bile acids, steroid hormone and vitamin D	Lecture	2	Mid Term-1, Quiz & End Sem Exam
26	Metabolic disorder of lipids.	Lecture	2,5	Mid Term-1, Quiz & End Sem Exam
27	Hypercholesterolemia, atherosclerosis, fatty liver and obesity	Lecture	2,5	Mid Term-1, Quiz & End Sem Exam
28	Quiz	Tutorial		Mid Term-1, Quiz & End Sem Exam
29	General reactions of amino acid metabolism: Transamination, deamination & decarboxylation	Lecture	2	Mid Term-1, Quiz & End Sem Exam
30	urea cycle and its disorders	Lecture	2,5	Mid Term-1, Quiz & End Sem Exam
31	Catabolism of phenylalanine and tyrosine and their metabolic disorders (Phenyketonuria, Albinism, alkeptonuria, tyrosinemia)	Lecture	2,5	Mid Term-2, Quiz & End Sem Exam
32	Group discussion on amino	Tutorial		Mid Term-2, Quiz



	acid metabolism			& End Sem Exam
33	Synthesis and significance of biological substances; 5-HT, melatonin,	Lecture	2	Mid Term-2, Quiz & End Sem Exam
34	dopamine, noradrenaline, adrenaline	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
35	Catabolism of heme; hyperbilirubinemia and jaundice methods to overcome	Lecture	4	Mid Term-2, Quiz & End Sem Exam
36	Seminar	Tutorial		Mid Term-2, Quiz & End Sem Exam
37	Introduction of Nucleic acid metabolism and genetic information transfer	Lecture	4	Mid Term-2, Quiz & End Sem Exam
38	Biosynthesis of purine nucleotides	Lecture	4	Mid Term-2, Quiz & End Sem Exam
39	Biosynthesis of pyrimidine nucleotides	Lecture	4	Mid Term-2, Quiz & End Sem Exam
40	Catabolism of purine nucleotides and Hyperuricemia and Gout disease	Lecture	4	Mid Term-2, Quiz & End Sem Exam
41	Unit test	Tutorial		Mid Term-2, Quiz & End Sem Exam
42	Organization of mammalian genome Structure of DNA and RNA and their functions.	Lecture	4	Mid Term-2, Quiz & End Sem Exam
43	DNA replication (semi conservative model)	Lecture	4	Mid Term-2, Quiz & End Sem Exam
44	Transcription or RNA synthesis	Lecture	4	Mid Term-2, Quiz & End Sem Exam
45	Seminar	Tutorial		Mid Term-2, Quiz & End Sem Exam
46	Genetic code	Lecture	4	Mid Term-2, Quiz & End Sem Exam
47	Translation or Protein synthesis and inhibitors	Lecture	4	Mid Term-2, Quiz & End Sem Exam
48	Introduction and properties of enzymes	Lecture	3	Mid Term-2, Quiz & End Sem Exam
49	nomenclature and IUB classification of enzymes	Lecture	3	Mid Term-2, Quiz & End Sem Exam
50	Enzyme kinetics (Michaelis plot, Line Weaver Burke plot)	Lecture	3	Quiz & End Sem Exam



51	Revision of enzyme kinetics	Tutorial		Quiz & End Sem Exam
52	Enzyme inhibitors with examples	Lecture	3	Quiz & End Sem Exam
53	Enzyme induction and repression	Lecture	3	Quiz & End Sem Exam
54	Regulation of enzymes	Lecture	3	Quiz & End Sem Exam
55	Group discussion on enzyme inhibitors	Tutorial		Quiz & End Sem Exam
56	Therapeutic applications of enzyme	Lecture	3	Quiz & End Sem Exam
57	Diagnostic applications of enzyme	Lecture	3	Quiz & End Sem Exam
58	isoenzymes	Lecture	3	Quiz & End Sem Exam
59	Structure and biochemical functions of coenzymes	Lecture	3	Quiz & End Sem Exam
60	Unit test	Tutorial		Quiz & End Sem Exam

**F. Examination Scheme:**

Components	A	CT	S/V/Q/HA	STI	EE
Weightage (%)	4	15	3	3	75



CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
<b>BP203T.1</b>	<b>BP203T.1.</b> Describe the concept of biomolecules and bioenergetics.	2	-	-	-	2	2	1	-	1	-	3		-	-	-
<b>BP203T.2.</b>	<b>BP203T.2.</b> Explain the metabolic pathways of biomolecules in both physiological and pathological conditions.	3	-	-	1	-	2	-	-	-	-	3		1	-	-
<b>BP203T.3.</b>	<b>BP203T.3.</b> Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.	3	2	-	3	-	2	-	-	-	-	3		-	2	-
<b>BP203T.4.</b>	<b>BP203T.4.</b> Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.	1	2	3	3	-	1	-	-	-	-	3		-	-	-
<b>BP203T.5.</b>	<b>BP203T.5.</b> Describe the clinical pathology of blood and urine.	2	-	1	-	-	-	-	-	-	-	3		-	-	-





CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination; A: Attendance

**G. Suggested Text/Reference Books:**

- Principles of Biochemistry by Lehninger.
- Harper’s Biochemistry by Robert K. Murry, Daryl K. Granner and Victor W. Rodwell.
- Biochemistry by Stryer.
- Biochemistry by D. Satyanarayan and U.Chakrapani
- Textbook of Biochemistry by Rama Rao.
- Textbook of Biochemistry by Deb.
- Outlines of Biochemistry by Conn and Stump

**H. Lecture Plan**

**I. Course Articulation Matrix (Mapping of COs with POs)**

**Sample Question Paper**

Amity Institute of Pharmacy Department of Pharmaceutical Chemistry IMID-SEMESTER(SEM–IIInd)2023-24						
Class:B.Pharm, IInd Semester						
SubjectName: BP203T BIOCHEMISTRY (Theory)-I		Time:1Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4,5	Q.2,3	Q.7,9,10	Q.6, 8		
The student will be able to						



- CO1.** Describe the concept of biomolecules and bioenergetics.
- CO2.** Explain the metabolic pathways of biomolecules in both physiological and pathological conditions.
- CO3.** Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.
- CO4.** Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.
- CO5.** Describe the clinical pathology of blood and urine.

COMap	QuestionNo.	Question	Marks
CO1	Q.1	Define Bioenergetics.	2
CO1	Q.2	Write the any two examples of inhibitors of electron transport chain.	2
CO2	Q.3	Write a short note on oxidative phosphorylation.	2
CO2	Q.4	Define gluconeogenesis.	2
CO2	Q.5	Write in short about glycolysis pathway.	2
CO2	Q.6	Write in detail about the beta oxidation of fatty acid.	10
CO4	Q.7	Give the Catabolism of purine and pyrimidine nucleotides.	10
CO3	Q.8	Give the structure and functions of DNA and RNA.	5
CO3	Q.9	Give the IUBMB Nomenclature & Classification of enzymes with suitable example.	5
CO3	Q.10	Write a note on Coenzymes.	5

Attainments		Rubric
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

**Attainments:** Only 38.6% of students secure more than 60% marks, indicating that they have not met any predetermined target level between 1 to 3.





# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

**AMITY UNIVERSITY MADHYA PRADESH, GWALIOR**

**AMITY INSTITUTE OF PHARMACY**

## **Programme Educational Objectives (PEOs)**

### **Bachelor of Pharmacy (B. Pharm.)**

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.





# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR
AMITY INSTITUTE OF PHARMACY
DEPARTMENT OF PHARMACOLOGY

## PROGRAMME OUTCOMES

**Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24**

### Programme Outcomes:

**[PO.1]. Pharmacy Knowledge:** Posses knowledge and compression of the core and basic knowledge assoctied with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team -building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well- being.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.



**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self- assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “-“

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
II SEM	BP 204T	3	3	3	3	2	2	3	1	1	3	1	-	-	-





# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

<b>DEPARTMENT OF PHARMACOLOGY</b>
<b>Course Handout</b>
Course : PATHOPHYSIOLOGY (THEORY)
Course Code : BP 204T, Crédits : 04, Session : 2023-24 (Even Sem.), Class : B. Pharm.1st Year
Faculty Name : Mr. Talever Singh

**Introduction:** This subject is intended to impart the fundamental knowledge on various aspects (the study of causes of diseases and reactions of the body to such disease producing causes), emphasis the basic concepts of bioassay.:

1. The relevant aspects of pathology of various conditions with reference to its pharmacological applications.
2. Understanding of basic pathophysiological mechanisms.
3. Help to study the syllabus of pathology.
4. Give baseline knowledge required to practice medicine safely, confidently, rationally, and effectively.

**Course Outcomes:** At the end of the course, students will be able to:

**BP204T.1.** Describe the etiology and pathogenesis of the selected disease states.

**BP204T.2.** Discuss the signs and symptoms of the diseases

**BP204T.3.** Mention the complications of the diseases.

**BP204T.4.** Distinguish environmental factors, physical, psychosocial, and cognitive characteristics of various diseases and conditions.

**BP204T.5** Identify implications of therapeutic interventions for diseases and conditions.

## A. Programme Outcomes:

**[PO.1]. Pharmacy Knowledge:** Posses knowledge and compression of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.



**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team -building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well- being.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

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**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

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**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self- assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.



## B. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	A minimum of 80% attendance is required to be maintained by a student to be qualified for taking up the Odd Semester examination	A	4 %
	Quiz/ Assignment/Open book test/ Field work/Group discussion/ Seminar	Q/A/OBT/FW/GD/S	3%
	Student – Teacher interaction	STA	3%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

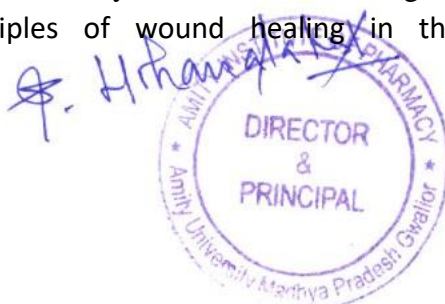
Q: Quiz, A: Assignment, OBT: Open book test, FW: Field work, GD: Group discussion, S: Seminar

## C. Syllabus

### Unit I. 10Hours

**Basic principles of Cell injury and Adaptation:** Introduction, definitions, Homeostasis, Components and Types of Feedback systems, Causes of cellular injury, Pathogenesis (Cell membrane damage, Mitochondrial damage, Ribosome damage, Nuclear damage), Morphology of cell injury – Adaptive changes (Atrophy, Hypertrophy, hyperplasia, Metaplasia, Dysplasia), Cell swelling, Intra cellular accumulation, Calcification, Enzyme leakage and Cell Death Acidosis & Alkalosis, Electrolyte imbalance.

**Basic mechanism involved in the process of inflammation and repair:** Introduction, Clinical signs of inflammation, Different types of Inflammation, Mechanism of Inflammation – Alteration in vascular permeability and blood flow, migration of WBC's, Mediators of inflammation, Basic principles of wound healing in the skin, Pathophysiology of Atherosclerosis





## Unit II. 10Hours

Cardiovascular System: Hypertension, congestive heart failure, ischemic heart disease (angina, myocardial infarction, atherosclerosis and arteriosclerosis)

Respiratory system: Asthma, Chronic obstructive airways diseases. Renal system: Acute and chronic renal failure.

## Unit III. 10Hours

### Haematological Diseases:

Iron deficiency, megaloblastic anemia (Vit B12 and folic acid), sickle cell anemia, thalasemia, hereditary acquired anemia, hemophilia

**Endocrine system:** Diabetes, thyroid diseases, disorders of sex hormones

**Nervous system:** Epilepsy, Parkinson's disease, stroke, psychiatric disorders: depression, schizophrenia and Alzheimer's disease.

**Gastrointestinal system:** Peptic Ulcer

## Unit IV. 8 Hours

Inflammatory bowel diseases, jaundice, hepatitis (A, B, C, D, E, F) alcoholic liver disease.

Disease of bones and joints: Rheumatoid arthritis, osteoporosis and gout

Principles of cancer: classification, etiology and pathogenesis of cancer

**Diseases of bones and joints:** Rheumatoid Arthritis, Osteoporosis, Gout

Principles of Cancer: Classification, etiology and pathogenesis of Cancer

## Unit V. 7 Hours

**Infectious diseases:** Meningitis, Typhoid, Leprosy, Tuberculosis

Urinary tract infections

**Sexually transmitted diseases:** AIDS, Syphilis, Gonorrhoea

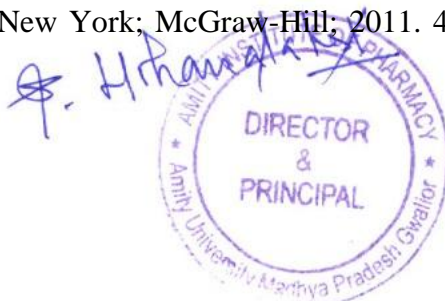
### Examination Scheme:

Components	CT	A	Q/A/OBT/FW/GD/S	STI	EE
Weightage (%)	15	4	3	3	75

Q: Quiz, A: Assignment, OBT: Open book test, FW: Field work, GD: Group discussion, S: Seminar, STI: Student – Teacher interaction

### D. Suggested Text/Reference Books:

1. Vinay Kumar, Abul K. Abas, Jon C. Aster; Robbins & Cotran Pathologic Basis of Disease; South Asia edition; India; Elsevier; 2014.
2. Harsh Mohan; Text book of Pathology; 6th edition; India; Jaypee Publications; 2003
3. Laurence B, Bruce C, Bjorn K. ; Goodman Gilman's The Pharmacological Basis of Therapeutics; 12th edition; New York; McGraw-Hill; 2011.
4. Best, Charles Herbert 1899-1978;



4. Taylor, Norman Burke 1885-1972; West, John B (John Burnard); Best and Taylor's Physiological basis of medical practice; 12th ed; united states; 5. William and Wilkins, Baltimore;1991 [1990 printing]. 6. Nicki R. Colledge, Brian R. Walker, Stuart  
5. H. Ralston;Davidson's Principles and Practice of Medicine; 21st edition; London; ELBS/Churchill Livingstone; 2010.  
6. Guyton A, John . E Hall; Textbook of Medical Physiology; 12th edition; WB Saunders Company; 2010. 8. Joseph DiPiro, Robert L. Talbert, Gary Yee, Barbara Wells, L. Michael Posey; Pharmacotherapy: A Pathophysiological Approach; 9th edition;  
7. London; McGraw-Hill Medical; 2014. 9. V. Kumar, R. S. Cotran and S. L. Robbins; Basic Pathology; 6th edition; Philadelphia; WB Saunders Company; 1997. 10. Roger Walker, Clive Edwards; Clinical Pharmacy and Therapeutics; 3rd edition; London; Churchill Livingstone publication; 2003.

### E. Lecture Plan

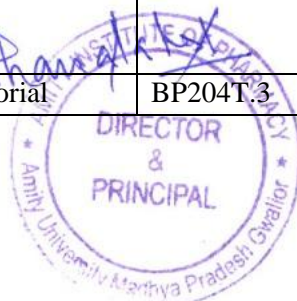
Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1.	Introduction of cellular injury	Lecture	BP 204T.1	Mid Term-1, Quiz & End Sem Exam
2.	Definitions of cellular injury,	Lecture	BP 204T.1	Mid Term-1, Quiz & End Sem Exam
3.	Homeostasis,	Lecture	BP 204T.1	Mid Term-1, Quiz & End Sem Exam
4.	Tutorial 1	Tutorial 1		
5.	Components and Types of Feedback systems,	Lecture	BP 204T.1	Mid Term-1, Quiz & End Sem Exam
6.	Causes of cellular injury	Lecture	BP 204T.1	Mid Term-1, Quiz & End Sem Exam
7.	Pathogenesis (Cell membrane damage, Mitochondrial damage)	Lecture	BP 204T.1	Mid Term-1, Quiz & End Sem Exam
8.	Tutorial 2	Tutorial 2		
9.	Pathogenesis (Ribosome	Lecture	BP 204T.1	Mid Term-1, Quiz &



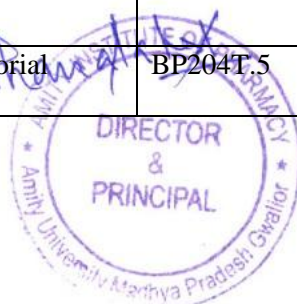
	damage, Nuclear damage)			End Sem Exam
10	Morphology of cell injury – Adaptive changes	Lecture	BP 204T.1	Mid Term-1, Quiz & End Sem Exam
11	(Atrophy, Hypertrophy, hyperplasia, Metaplasia, Dysplasia)	Lecture	BP 204T.1	Mid Term-1, Quiz & End Sem Exam
12	Tutorial 3	Tutorial 3		
13	Cell swelling, Intra cellular accumulation,	Lecture	BP 204T.1	Mid Term-1, Quiz & End Sem Exam
14	Acidosis & Alkalosis, Electrolyte imbalance	Lecture	BP 204T.1	Mid Term-1, Quiz & End Sem Exam
15	Introduction, Clinical signs of inflammation,	Lecture	BP 204T.1	Mid Term-1, Quiz & End Sem Exam
16	Tutorial 4	Tutorial 4		
17	Different types of Inflammation, Mechanism of Inflammation – Alteration in vascular permeability and blood flow	Lecture	BP 204T.1	Mid Term-1, Quiz & End Sem Exam
18	migration of WBC's, Mediators of inflammation, Basic principles of wound healing in the skin,	Lecture	BP 204T.1	Mid Term-1, Quiz & End Sem Exam
19	Pathophysiology of Atherosclerosis	Lecture	BP 204T.1	Mid Term-1, Quiz & End Sem Exam
20	Hypertension, congestive heart failure,	Lecture	BP 204T.1	Mid Term-1, Quiz & End Sem Exam
21	Tutorial 5	Tutorial 5		
22	ischemic heart disease (angina, myocardial	Lecture	BP204T.2	Mid Term-1, Quiz & End Sem



	infarction)			Exam
23	atherosclerosis and arteriosclerosis	Lecture	BP204T.2	Mid Term-1, Quiz & End Sem Exam
24	Tutorial 6	Tutorial 6		
25	Asthma	Lecture	BP204T.2	Mid Term-1, Quiz & End Sem Exam
26	Chronic obstructive airways diseases.	Lecture	BP204T.2	Mid Term-1, Quiz & End Sem Exam
27	Acute and chronic renal failure	Tutorial	BP204T.2	Mid Term-1, Quiz & End Sem Exam
28	Tutorial 7	Tutorial 7		
29	Iron deficiency, megaloblastic anemia (Vit B12 and folic acid),	Lecture	BP204T.3	Mid Term-2, Quiz & End Sem Exam
30	sickle cell anemia, thalasemia	Lecture	BP204T.3	Mid Term-2, Quiz & End Sem Exam
31	hereditary acquired anemia, hemophilia	Lecture	BP204T.3	Mid Term-2, Quiz & End Sem Exam
32	Tutorial 8	Tutorial 8		
33	Diabetes, thyroid diseases	Tutorial	BP204T.3	Mid Term-2, Quiz & End Sem Exam
34	disorders of sex hormones	Lecture	BP204T.3	Mid Term-2, Quiz & End Sem Exam
35	Epilepsy	Lecture	BP204T.3	Mid Term-2, Quiz & End Sem Exam
36	Tutorial 9	Tutorial 9		
37	stroke	Lecture	BP204T.3	Mid Term-2, Quiz & End Sem Exam
38	Schizophrenia	Tutorial	BP204T.3	Mid Term-



				2, Quiz & End Sem Exam
39	Alzheimer's disease	Lecture	BP204T.3	Mid Term-2, Quiz & End Sem Exam
40	Tutorial 10	Tutorial 10		
41	Peptic Ulcer	Lecture	BP204T.3	Mid Term-2, Quiz & End Sem Exam
42	Inflammatory bowel diseases.	Lecture	BP204T.4	Mid Term-2, Quiz & End Sem Exam
43	jaundice	Tutorial	BP204T.4	Mid Term-2, Quiz & End Sem Exam
44	Tutorial 11	Tutorial 11		
45	hepatitis (A,B,C,D,E,F)	Lecture	BP204T.4	Mid Term-2, Quiz & End Sem Exam
46	alcoholic liver disease	Lecture	BP204T.4	Mid Term-2, Quiz & End Sem Exam
47	Rheumatoid arthritis,	Lecture	BP204T.4	Mid Term-2, Quiz & End Sem Exam
48	Tutorial 12	Tutorial 12		
49	osteoporosis	Tutorial	BP204T.4	Mid Term-2, Quiz & End Sem Exam
50	gout	Lecture	BP204T.4	Quiz & End Sem Exam
51	psychiatric disorders: depression	Lecture	BP204T.4	Quiz & End Sem Exam
52	Tutorial 13	Tutorial 13		
53	Classification, etiology and pathogenesis of cancer	Lecture	BP204T.5	Quiz & End Sem Exam
54	Parkinson's disease	Tutorial	BP204T.5	Quiz & End Sem Exam



55	Meningitis	Lecture	BP204T.5	Quiz & End Sem Exam
56	Tutorial 14	Tutorial 14		
57	Typhoid,	Lecture	BP204T.5	Quiz & End Sem Exam
58	Leprosy,	Lecture	BP602T.5	Mid Term-2, Quiz & End Sem Exam
59	Tuberculosis	Lecture	BP204T.5	Quiz & End Sem Exam
60	Tutorial 15	Tutorial 15		
61	Urinary tract infections	Lecture	BP204T.5	Quiz & End Sem Exam
62	AIDS, Syphilis, Gonorrhea	Lecture	BP204T.5	Quiz & End Sem Exam

#### F. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES										
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11
BP204T.1	Discuss the different type of components and feedback systems present in the body.	3	2	3	2	1	2	2	1	1	-	1
BP204T.2	What are the adaptive changes occurs in morphology during cell injury.	3	2	2	3	-	1	2	1	3	1	1
BP204T.3	Write a descriptive note on disease known as porous bone or silent disease.	3	1	1	-	1	2	2	2	2	1	-
BP204T.4	What are the causes, symptoms and treatment of epilepsy.	3	2	2	1	1	1	2	-	2	-	-
BP204T.5	Write a descriptive note on Tuberculosis.	3	1	1	1	1	3	2	1	2	2	1

### Sample Question Paper

Amity School of Pharmacy Department of Pharmacology I MID-SEMESTER (SEM-II)2023-24						
Class: B. Pharm. II Semester						
Subject Name: BP204T Pathophysiology		Time:1 Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		
CO Map	Question No.	Question				Marks
CO1	Q.1	Write a note on megaloblastic anaemia.				2
CO1	Q.2	Discuss the symptoms and pathophysiology of Parkinson's disease.				2
	Q.3	Discuss in detail about Hypertension				2
	Q.4	Explain the symptoms and pathophysiology of Rheumatoid Arthritis.				2
	Q.5	Write a detailed note on pathophysiology of cancer.				2
CO1	Q.6	Write a about etiology, clinical presentation, diagnosis, and treatment of Peptic Ulcer.				10
CO2	Q.7	Discuss the symptoms and management of epilepsy.				10
CO2	Q.8	Describe Congestive heart failure in detail.				5
	Q.9	Write an explanatory note on hepatitis A, B and C?				5
CO2	Q.10	Discuss the pathophysiology and treatment strategy for alcoholic liver disease in detail.				5

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&  
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Cwalior

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**Attainment: No level**

35.2 % Percentage of students secured more than 60% marks, so this course Pathophysiology – Theory (BP204T) not attained any Level.

*H. H. H. H.*







# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICS

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

**Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24**

### **Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.



**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “- “

PROGRAMME ARTICULATION MATRIX															
		PO 1	PO 2	PO 3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PSO 1	PSO 2	PSO 3
II SEM	BP205 T	3	-	2	3	1	3	2	1	1	2	2			

*[Handwritten Signature]*  
 AMITY INSTITUTE OF PHARMACY  
 DIRECTOR & PRINCIPAL  
 Amity University, Madhya Pradesh Gwalior



# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

## DEPARTMENT OF PHARMACEUTICS

### Course Handout

Course : COMPUTER APPLICATION IN PHARMACY THEORY

Course Code: BP205T, Credits: 03, Session:2023-24 (Even Sem.), Class: B.Pharm - 1st Year

Faculty Name: Dr. Jovita Kanoujia

**A. Introduction:** This subject deals with the introduction database, database management system, computer application in clinical studies and use of databases.

**B. Course Outcomes:** At the end of the course, students will be able to:

**BP205T.1.** Apply one's complement, and two's complement methods to solve various problems based on the binary system.

**BP205T.2.** Illustrate data flow diagrams, product cycle and discover web technologies application in pharmacy.

**BP205T.3.** Define the role of computer in various fields of pharmacy

**BP205T.4.** Explain the application of bioinformatics in various disciplines.

**BP205T.5.** Outline the use of LIMS, TIMS and CDS in pre-clinical development.

**C. Programme Outcomes:**

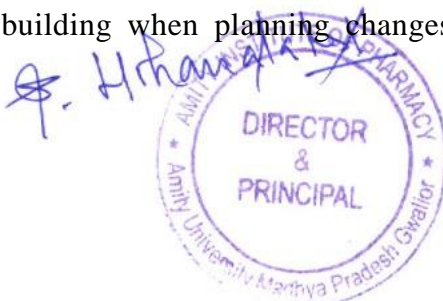
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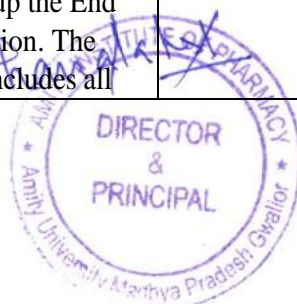
**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**D. Assessment Plan:**

<b>Component of Evaluation</b>	<b>Description</b>	<b>Code</b>	<b>Weightage %</b>
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	3%
	Student – Teacher interaction	S-T I	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all	A	4%



	types of leaves including medical leaves.		
End Semester Examination	End Semester Examination	EE	50%
<b>Total</b>			<b>75%</b>

## E. Syllabus

### UNIT – I

**Number system:** Binary number system, Decimal number system, Octal number system, Hexadecimal number systems, conversion decimal to binary, binary to decimal, octal to binary etc, binary addition, binary subtraction – One’s complement, Two’s complement method, binary multiplication, binary division.

**Concept of Information Systems and Software :** Information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project

### UNIT –II

**Web technologies:** Introduction to HTML, XML, CSS and Programming languages, introduction to web servers and Server Products, Introduction to databases, MYSQL, MS ACCESS, Pharmacy Drug database

### UNIT – III

**Application of computers in Pharmacy –** Drug information storage and retrieval, Pharmacokinetics, Mathematical model in Drug design, Hospital and Clinical Pharmacy, Electronic Prescribing and discharge (EP) systems, barcode medicine identification and automated dispensing of drugs, mobile technology and adherence monitoring Diagnostic System, Lab-diagnostic System, Patient Monitoring System, Pharma Information System.

### UNIT – IV

**Bioinformatics:** Introduction, Objective of Bioinformatics, Bioinformatics Databases, Concept of Bioinformatics, Impact of Bioinformatics in Vaccine Discovery

### UNIT-V

**Computers as data analysis in Preclinical development:** Chromatographic data analysis(CDS), Laboratory Information management System (LIMS) and Text Information Management System(TIMES).

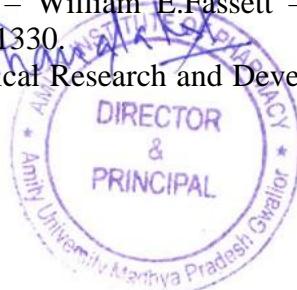
## F. Examination Scheme:

Components	A	CT	S/V/Q/HA	STI	EE
Weightage (%)	4	15	3	3	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination; A: Attendance

## G. Suggested Text/Reference Books:

- Computer Application in Pharmacy – William E.Fassett –Lea and Febiger, 600 South Washington Square, USA, (215) 922-1330.
- Computer Application in Pharmaceutical Research and Development –Sean Ekins –Wiley-

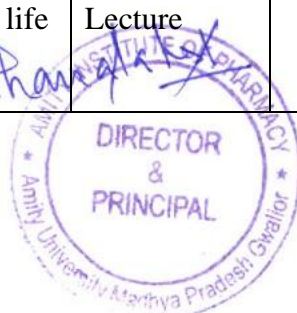


Interscience, A John Willey and Sons, INC., Publication, USA.

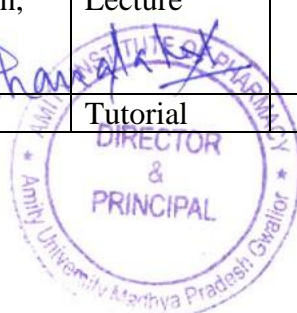
- Bioinformatics (Concept, Skills and Applications) – S.C.Rastogi-CBS Publishers and Distributors, 4596/1- A, 11 Darya Gani, New Delhi – 110 002(INDIA)
- Microsoft office Access - 2003, Application Development Using VBA, SQL Server, DAP and Infopath – Cary N.Prague – Wiley Dreamtech India (P) Ltd., 4435/7, Ansari Road, Daryagani, New Delhi – 110002.

## H. Lecture Plan

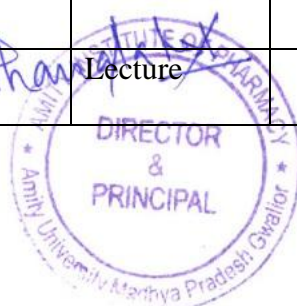
Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Binary number system, Decimal number system, Octal number system, Hexadecimal number systems,	Lecture	1	Mid Term-1, Quiz & End Sem Exam
2	Conversion decimal to binary, binary to decimal, octal to binary etc,	Lecture	1	Mid Term-1, Quiz & End Sem Exam
3	Revision	Tutorial	1	Mid Term-1, Quiz & End Sem Exam
4	Binary addition, binary subtraction – One's complement, binary	Lecture	1	Mid Term-1, Quiz & End Sem Exam
5	Two's complement method, Binary multiplication, binary division	Lecture	1	Mid Term-1, Quiz & End Sem Exam
6	Quiz	Tutorial	1	Mid Term-1, Quiz & End Sem Exam
7	Concept of Information Systems and Software : Information gathering, requirement and feasibility analysis,	Lecture	2	Mid Term-1, Quiz & End Sem Exam
8	Data flow diagrams, process Specifications	Lecture	2	Mid Term-1, Quiz & End Sem Exam
9	Class Test	Tutorial	2	Mid Term-1, Quiz & End Sem Exam
10	Input/output design, process life cycle, Planning and managing the project	Lecture	2	Mid Term-1, Quiz & End Sem Exam



11	<b>Web technologies:</b> Introduction to HTML, XML, CSS	Lecture	2	Mid Term-1, Quiz & End Sem Exam
12	Group discussion	Tutorial	2	Mid Term-1, Quiz & End Sem Exam
13	Programming languages, Introduction to web servers and ServerProducts	Lecture	2	Mid Term-1, Quiz & End Sem Exam
14	Introduction to databases, MYSQL, MS ACCESS, Pharmacy Drug database	Lecture	2	Mid Term-1, Quiz & End Sem Exam
15	Revision	Tutorial	2	Mid Term-1, Quiz & End Sem Exam
16	<b>Application of computers in Pharmacy</b> – Drug information storage and retrieval,	Lecture	3	Mid Term-1, Quiz & End Sem Exam
17	Pharmacokinetics, Mathematical model in Drug design	Lecture	3	Mid Term-1, Quiz & End Sem Exam
18	Quiz	Tutorial	3	Mid Term-1, Quiz & End Sem Exam
19	Hospital and Clinical Pharmacy, Electronic Prescribing and discharge (EP) systems,	Lecture	3	Mid Term-1, Quiz & End Sem Exam
20	Barcode medicine identification	Lecture	3	Mid Term-1, Quiz & End Sem Exam
21	Quiz	Tutorial	3	Mid Term-1, Quiz & End Sem Exam
22	Automated dispensing of drugs, Mobile technology and adherence monitoring	Lecture	3	Mid Term-1, Quiz & End Sem Exam
23	Diagnostic System, Lab-diagnostic System,	Lecture	3	Mid Term-2, Quiz & End Sem Exam
24	Group discussion	Tutorial	3	Mid Term-2, Quiz & End Sem Exam
25	Patient Monitoring System, Pharma Information System	Lecture	3	Mid Term-2, Quiz & End Sem Exam
26	<b>Bioinformatics:</b> Introduction,	Lecture	3	Mid Term-2, Quiz & End Sem Exam
27	Unit Test	Tutorial	4	Mid Term-2,



				Quiz & End Sem Exam
28	Objective of Bioinformatics,	Lecture	4	Mid Term-2, Quiz & End Sem Exam
29	Bioinformatics Databases,	Lecture	4	Mid Term-2, Quiz & End Sem Exam
30	Revision	Tutorial	4	Mid Term-2, Quiz & End Sem Exam
31	Concept of Bioinformatics,	Lecture	4	Mid Term-2, Quiz & End Sem Exam
32	Impact of Bioinformatics in Vaccine Discovery	Lecture	4	Mid Term-2, Quiz & End Sem Exam
33	Quiz	Tutorial	4	Mid Term-2, Quiz & End Sem Exam
34	Impact of Bioinformatics in Vaccine Discovery	Lecture	4	Mid Term-2, Quiz & End Sem Exam
35	Chromatographic data analysis(CDS),	Lecture	4	Mid Term-2, Quiz & End Sem Exam
36	Group discussion	Tutorial	5	Mid Term-2, Quiz & End Sem Exam
37	Features of CDS	Lecture	5	Mid Term-2, Quiz & End Sem Exam
38	HPLC, GC	Lecture	5	Mid Term-2, Quiz & End Sem Exam
39	Unit test	Tutorial	5	Mid Term-2, Quiz & End Sem Exam
40	Laboratory Information management System (LIMS)	Lecture	5	Mid Term-2, Quiz & End Sem Exam
41	Laboratory Information management System (LIMS)	Lecture	5	Mid Term-2, Quiz & End Sem Exam
42	Revision	Tutorial	5	Mid Term-2, Quiz & End Sem Exam
43	Text Information Management	Lecture	5	Mid Term-2, Quiz & End Sem





	System(TIMs), Steps in TIMs			Exam
44	Features of TIMs	Lecture	5	Mid Term-2, Quiz & End Sem Exam
45	Class test	Tutorial	5	Mid Term-2, Quiz & End Sem Exam

### I. Course Articulation Matrix (Mapping of COs with POs)

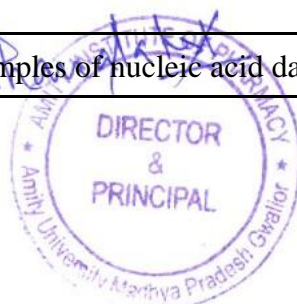
CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES											CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P S O 1	P S O 2	P S O 3
<b>BP205T.1</b>	<b>BP205T.1.</b> Apply one's complement, and two's complement methods to solve various problems based on the binary system.	3	-	3	3	1	2	1	-	1	-	-	-	-	-
<b>BP205T.2</b>	<b>BP205T.2.</b> Illustrate data flow diagrams, product cycle and discover web technologies application in pharmacy.	2	1	3	3	-	2	1	-	-	-	3	-	-	-
<b>BP205T.3</b>	<b>BP205T.3.</b> Define the role of computer in various fields of pharmacy	3	2	2	3	2	2	3	3	2	1	2	-	-	-

*A. Hirani*  
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 Gwalior

<b>BP205T.4</b>	<b>BP205T.4.</b> Explain the application of bioinformatics in various disciplines.	2	1	3	3	-	2	-	2	1	1	3	1	-	-
<b>BP205T.5</b>	<b>BP205T.5.</b> Outline the use of LIMS, TIMS and CDS in pre-clinical development.	2	3	3	3	2	2	-	3	1	-	3	1	1	-

### Sample Question Paper

Amity Institute of Pharmacy Department of Pharmaceutics I MID-SEMESTER (SEM –IInd) 2023-24						
Class: B.Pharm, II Semester						
Subject Name: BP205T Computer Application in Pharmacy-Theory		Time: 1 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q1,3,4,9,10	Q2,5,6	Q7	Q8		
<p>The student will be able to</p> <p>CO1-Apply one's complement, and two's complement methods to solve various problems based on the binary system.</p> <p>CO2-Illustrate data flow diagrams, product cycle and discover web technologies application in pharmacy.</p> <p>CO3-Define the role of computer in various fields of pharmacy</p> <p>CO4-Explain the application of bioinformatics in various disciplines.</p> <p>CO5-Outline the use of LIMS, TIMS and CDS in pre-clinical development.</p>						
CO Map	Question No.	Question				Marks
CO3	Q.1	What is the two examples of software used in hospital pharmacy?				2
CO3	Q.2	Outline the limitation of a barcode identification system.				2
CO4	Q.3	What are examples of nucleic acid databases?				2



CO2	Q.4	Define XML and HTML.	2
CO1	Q.5	What is binary system?	2
CO5	Q.6	Explain the role of LIMS in pharmacy.	10
CO3	Q.7	Make use of a computer software in pharmacokinetic system?	10
CO3	Q.8	Compare computer-based e-prescription over handwritten prescription.	5
CO1	Q.9	How MS Access is useful in data management?	5
CO4	Q.10	Write about role of biopharmaceutic in vaccine discovery	5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**Attainments:** Only 42.0% of students secure more than 60% marks, indicating that they have not met any predetermined target level between 1 to 3.





AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACOLOGY

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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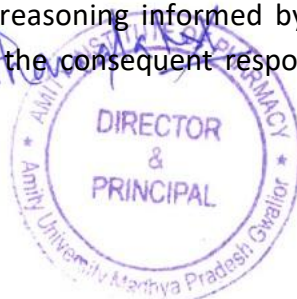
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**Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3: Substantial (High)

If there is no correlation, put “-”

PROGRAMME ARTICULATION MATRIX																
		PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
II SEM																
	BP206T	2	1	2	3	1	3	2	1	2	3	3				

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# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

<b>DEPARTMENT OF PHARMACOLOGY</b>
<b>Course Handout</b>
Course : ENVIRONMENTAL SCIENCES-THEORY
Course Code: BP206T, Credits: 03, Session:2023-24 (Even Sem.), Class: B.Pharm - 1st Year
Faculty Name: Dr. Rwitabrata Mallick

**A. Introduction:** This subject deals with the scientific study of the environmental system and the status of its inherent or induced changes on organisms. It includes not only the study of physical and biological characters of the environment but also the social and cultural factors and the impact of man on environment.

**B. Course Outcomes:** At the end of the course, students will be able to:

**BP206T: 1.** Create the awareness about environmental problems among learners.

**BP206T: 2.** Impart basic knowledge about the environment and its allied problems.

**BP206T: 3.** Develop an attitude of concern for the environment.

**BP206T: 4.** Motivate learner to participate in environment protection and environment improvement.

**BP206T: 5.** Acquire skills to help the concerned individuals in identifying and solving environmental problems.

**C. Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.



**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**D. Assessment Plan:**



Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	3%
	Student – Teacher interaction	S-T I	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	50%
<b>Total</b>			<b>75%</b>

## E. Syllabus

### Unit-I

The Multidisciplinary nature of environmental studies

Natural Resources

Renewable and non-renewable resources:

Natural resources and associated problems

a) Forest resources; b) Water resources; c) Mineral resources; d) Food resources; e) Energy resources; f) Land resources: Role of an individual in conservation of natural resources.

### Unit-II

Ecosystems

☑ Concept of an ecosystem.





☐ Structure and function of an ecosystem.

☐ Introduction, types, characteristic features, structure and function of the ecosystems: Forest ecosystem; Grassland ecosystem; Desert ecosystem; Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

### Unit- III

Environmental Pollution: Air pollution; Water pollution; Soil pollution

#### F. Examination Scheme:

Components	A	CT	S/V/Q/HA	STI	EE
Weightage (%)	4	15	3	3	50

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination; A: Attendance

#### G. Suggested Text/Reference Books:

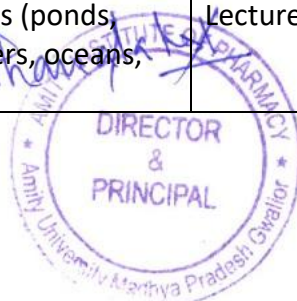
1. Y.K. Sing, Environmental Science, New Age International Pvt, Publishers, Bangalore
2. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
3. Bharucha Erach, The Biodiversity of India, Mapin Pu blishing Pvt. Ltd., Ahmedabad – 380 013, India,
4. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
5. Clark R.S., Marine Pollution, Clanderson Press Oxford
6. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
7. De A.K., Environmental Chemistry, Wiley Eastern Ltd.

#### H. Lecture Plan

Lecture	Topics	Mode of Delivery	Correspon ding CO	Mode of Assessing CO
1	The Multidisciplinary nature of environmental studies	Lecture	3,4	Mid Term-1, Quiz & End Sem Exam
2	Natural Resources Renewable and non-renewable resources.	Lecture	3,4	Mid Term-1, Quiz & End Sem Exam



3	Natural resources and associated problems	Lecture	3,4	Mid Term-1, Quiz & End Sem Exam
4	a) Forest resources;	Lecture	3,4	Mid Term-1, Quiz & End Sem Exam
5	b) Water resources;	Lecture	3,4	Mid Term-1, Quiz & End Sem Exam
6	c) Mineral resources;	Lecture	3,4	Mid Term-1, Quiz & End Sem Exam
7	d) Food resources;	Lecture	3,4	Mid Term-1, Quiz & End Sem Exam
8	e) Energy resources;	Lecture	3,4	Mid Term-1, Quiz & End Sem Exam
9	f) Land resources:	Lecture	3,4	Mid Term-1, Quiz & End Sem Exam
10	Role of an individual in conservation of natural resources	Lecture	2	Mid Term-1, Quiz & End Sem Exam
11	Ecosystems	Lecture	2	Mid Term-2, Quiz & End Sem Exam
12	☐ Concept of an ecosystem.	Lecture	2	Mid Term-2, Quiz & End Sem Exam
13	☐ Structure and function of an ecosystem.	Lecture	2	Mid Term-2, Quiz & End Sem Exam
14	☐ Introduction, types of ecosystems.	Lecture	3	Mid Term-2, Quiz & End Sem Exam
15	characteristic features of the ecosystems	Lecture	3	Mid Term-2, Quiz & End Sem Exam
16	structure and function of the ecosystems	Lecture	3	Mid Term-2, Quiz & End Sem Exam
17	Forest ecosystem;	Lecture	3	Mid Term-2, Quiz & End Sem Exam
18	Grassland ecosystem;	Lecture	3	Mid Term-2, Quiz & End Sem Exam
19	Desert ecosystem;	Lecture	3	Mid Term-2, Quiz & End Sem Exam
20	Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)	Lecture	3	Mid Term-2, Quiz & End Sem Exam



21	Environmental Pollution	Lecture	1,2	Mid Term-2, Quiz & End Sem Exam
22	Air pollution;	Lecture	1,2	Mid Term-2, Quiz & End Sem Exam
23	Air pollution;	Lecture	1,2	Mid Term-2, Quiz & End Sem Exam
24	Quiz	Lecture	1,2	Mid Term-2, Quiz & End Sem Exam
25	Water pollution;	Lecture	1,2	Mid Term-2, Quiz & End Sem Exam
26	Water pollution;	Lecture	1,2	Mid Term-2, Quiz & End Sem Exam
27	Quiz	Lecture	1,2	Mid Term-2, Quiz & End Sem Exam
28	Soil pollution	Lecture	1,2	Mid Term-2, Quiz & End Sem Exam
29	Soil pollution	Lecture	1,2	Mid Term-2, Quiz & End Sem Exam
30	Quiz	Lecture	1,2	Mid Term-2, Quiz & End Sem Exam

### I. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES											CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
<b>BP206T: 1</b>	<b>BP206T: 1.</b> Create the awareness about environmental problems among learners.	3	1	1	1	1	2	1	-	1	3	2				
<b>BP206T: 2</b>	<b>BP206T: 2.</b> Impart basic knowledge about the environment and its allied problems.	2	1	2	1	-	2	1	-	1	3	3				



<b>BP206T: 3</b>	<b>BP206T: 3.</b> Develop an attitude of concern for the environment.	2	1	2	2	2	2	2	1	2	3	2				
<b>BP206T: 4</b>	<b>BP206T: 4.</b> Motivate learner to participate in environment protection and environment improvement.	2	1	1	1	-	2	1	1	1	3	3				
<b>BP206T: 5</b>	<b>BP206T: 5.</b> Acquire skills to help the concerned individuals in identifying and solving environmental problems	2	1	1	1	2	2	1	1	1	3	3				

### Sample Question Paper

Amity Institute of Pharmacy Department of Pharmacology I MID-SEMESTER (SEM –IIInd) 2022-23						
Class: B. Pharm, II Semester						
Subject Name: Environmental Sciences BP206T-Theory		Time: 1 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q1,Q2,Q5	Q3,Q4				
The student will be able to <b>CO: 3.</b> Develop an attitude of concern for the environment.						



CO: 4. Motivate learner to participate in environment protection and environment improvement.			
CO Map	Question No.	Question	Marks
CO3,4	Q.1	Explain the structure and function of ecosystem.	5
CO3,4	Q.2	Give example of two direct and two indirect benefits of forests.	5
CO3,4	Q.3	Write the composition, structure, and function of atmosphere.	5
CO3,4	Q.4	Write about various physical characteristics of water.	5
CO3,4	Q.5	Write the cause, effect and control of air pollution.	10

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**Attainments: level :1**

69.3% of students secure more than 60% marks, so this course: Environmental Sciences-Theory (BP206T) attained level 1.





AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACOLOGY

## PROGRAMME OUTCOMES

Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

### Programme Outcomes:

**[PO.1]. Pharmacy Knowledge:** Posses knowledge and compression of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

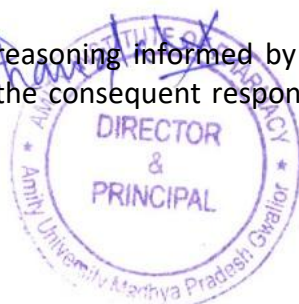
**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team -building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well- being.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.



**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self- assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3: Substantial (High)

If there is no correlation, put “-“

PROGRAMME ARTICULATION MATRIX												
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
II SEM	BP207P	3	2	2	3	1	2	2	1	3	2	3

*S. Hirani*  




<b>DEPARTMENT OF PHARMACOLOGY</b>
<b>Course Handout</b>
Course : Human Anatomy and Physiology (Practical)
Course Code : BP207P, Credits : 02, Session : 2023-24 (Even Sem.), Class : B. Pharm. First Year
Faculty Name : Mr. Talever Singh

**Introduction:** This subject is designed to impart fundamental and practical knowledge of pharmaceutical *microbiology* and various categories of microorganisms especially for the production of alcohol, antibiotics, vaccines, vitamins enzymes etc.

**A. Course Outcomes:** At the end of the course, students will be able to:

**BP207P: 1.** To study the human body systems using specimen, models, etc.,

**BP207P: 2.** Recording of body temperature.

**BP207P: 3.** To demonstrate positive and negative feedback mechanism.

**BP207P: 4.** Determination of tidal volume and vital capacity.

**BP207P: 5.** Study of family planning devices and pregnancy diagnosis test.

**BP207P: 6.** Demonstration of total blood count by cell analyser.

**B. Programme Outcomes:**

**[PO.1].Pharmacy Knowledge:** Posses knowledge and compression of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team -building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well- being.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers,





employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self- assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**C. Assessment Plan:**

<b>Component of Evaluation</b>	<b>Description</b>	<b>Code</b>	<b>Weightage %</b>
Continuous Internal Evaluation	Mid Term 1	CT	10%
	Mid Term 2		
	Lab record	LR	1%
	Viva	V	2%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves Including medical leaves.	A	2%
End Semester Examination	End Semester Examination	EE	35%
<b>Total</b>			<b>50%</b>

PR: Practical Records, RV: Regular viva, As: Assignment



#### D. Syllabus

1. To study the integumentary and special senses using specimen, models, etc.,
2. To study the nervous system using specimen, models, etc.,
3. To study the endocrine system using specimen, models, etc
4. To demonstrate the general neurological examination
5. To demonstrate the function of olfactory nerve
6. To examine the different types of taste.
7. To demonstrate the visual acuity
8. To demonstrate the reflex activity
9. Recording of body temperature
10. To demonstrate positive and negative feedback mechanism.
11. Determination of tidal volume and vital capacity.
12. Study of digestive, respiratory, cardiovascular systems, urinary and reproductive systems with the help of models, charts and specimens.
13. Recording of basal mass index.
14. Study of family planning devices and pregnancy diagnosis test.
15. Demonstration of total blood count by cell analyser
16. Permanent slides of vital organs and gonads.

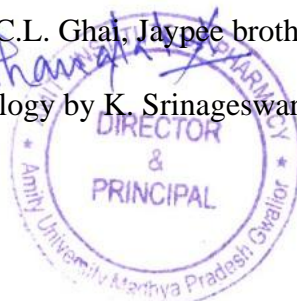
#### E. Examination Scheme:

Components	A	CT	LR	V	EE
Weightage (%)	2	10	1	2	35

PR: Practical Records, RV: Regular viva, As: Assignment

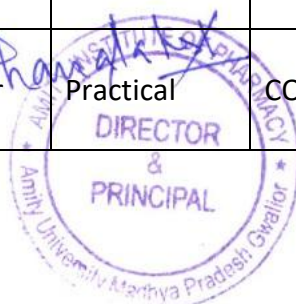
#### F. Suggested Text/Reference Books:

1. Essentials of Medical Physiology by K. Sembulingam and P. Sembulingam. Jaypee brothers medical publishers, New Delhi.
2. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
3. Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co,Riverview,MI USA
4. Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.
5. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.
6. Textbook of Human Histology by Inderbir Singh, Jaypee brothers medical publishers, New Delhi.
7. Textbook of Practical Physiology by C.L. Ghal, Jaypee brothers medical publishers, New Delhi.
8. Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma,



**G. Lecture Plan**

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1.	1. To study the integumentary and special senses using specimen, models, etc.,	Practical	CO1	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
2.	2. To study the nervous system using specimen, models, etc.,	Practical	CO1	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
3.	3. To study the endocrine system using specimen, models, etc	Practical	CO1	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
4.	4. To demonstrate the general neurological examination	Practical	CO, 9	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
5.	5. To demonstrate the function of olfactory nerve	Practical	CO1, 11	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
6.	6. To examine the different types of taste.	Practical	CO1, 9	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
7.	7. To demonstrate the visual activity	Practical	CO1, 9, 10, 11	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
8.	8. To demonstrate the reflex activity	Practical	CO1, 10, 11	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
9.	9. Recording of body temperature	Practical	CO1, 9	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
10.	10. To demonstrate positive and negative feedback mechanism.	Practical	CO1	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
11.	11. Determination of tidal volume and vital capacity.	Practical	CO1, 11	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
12.	12. Study of digestive, respiratory, cardiovascular systems, urinary and	Practical	CO1,11	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce



	reproductive systems with the help of models, charts and specimens.			for both
13.	13. Recording of basal mass index.	Practical	CO1, 11	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
14.	14. Study of family planning devices and pregnancy diagnosis test.	Practical	CO1, 11	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
15.	15. Demonstration of total blood count by cell Analyzer	Practical	CO1, 11	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
16.	16. Permanent slides of vital organs and gonads.	Practical	CO1, 11	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both

#### H. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES										
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11
<b>BP207P: 1.</b>	<b>BP207P: 1.</b> To study the human body systems using specimen, models, etc.,	1	1	1	3	1	-	-	1	2	2	3
<b>BP207P: 2</b>	<b>BP207P: 2.</b> Recording of body temperature.	2	1	1	3	1	-	1	1	2	2	2
<b>BP207P: 3</b>	<b>BP207P: 3.</b> To demonstrate positive and negative feedback mechanism.	1	1	1	2	1	-	-	1	1	2	2
<b>BP207P: 4</b>	<b>BP207P: 4.</b> Determination of tidal volume and vital capacity.	2	1	1	3	1	-	1	1	2	3	2
<b>BP207P: 5</b>	<b>BP207P: 5.</b> Study of family planning devices and pregnancy diagnosis test.	2	1	1	3	1	-	1	1	2	2	2
<b>BP207P: 6</b>	<b>BP207P: 6.</b> Demonstration of total blood count by cell analyser.	3	1	1	2	1	-	1	1	2	2	2

*S. Hirani*  
 AMITY INSTITUTES OF PHARMACY  
 DIRECTOR & PRINCIPAL  
 Amity University, Madhya Pradesh  
 Cwalior

## Sample Question Paper

Amity Institute of Pharmacy Department of Pharmacy I MID-SEMESTER (SEM-II) 2023-24						
Class: B. Pharm II Semester						
Subject Name: Human Anatomy and Physiology-II BP 207P (Practical)			Time: 4 Hrs		Max. Marks: 40	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,3	Q.2		Q.2	Q.2	
Student will be able to CO1: To study the human body systems using specimen, models, etc., CO2: To demonstrate positive and negative feedback mechanism.						
<b>CO Map</b>	<b>Question No.</b>	<b>Question</b>				<b>Marks</b>
CO1 and CO3	Q.1	Synopsis				10
CO3	Q.2	To demonstrate the reflex activity				25
CO1 and CO3	Q.3	Viva voce				5

<b>Attainments</b>		<b>Rubric</b>
<b>Level</b>	1	IF 60% of students secure more than 60% marks then level 1
<b>Level</b>	2	IF 70% of students secure more than 60% marks then level 2
<b>Level</b>	3	IF 80% of students secure more than 60% marks then level 3

### **Attainments: level 3**

98.9% of students secure more than 60% marks, so this course: Human Anatomy and Physiology (Practical) (BP207P) attained level 3.





AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

**Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24**

### Programme Outcomes:

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honor personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.



**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “- “

PROGRAMME ARTICULATION MATRIX																
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
I SEM																

*H. H. H.*  


II SEM																
	BP208P	3	1	2	1	1	2	-	2	-	-	-	-	1	1	-
III SEM																
IV SEM																
	-															
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V SEM																
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VI SEM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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VII SEM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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Dr. Hirani  
 AMITY INSTITUTE OF PHARMACY  
 DIRECTOR & PRINCIPAL  
 Amity University, Madhya Pradesh, Gwalior





# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

<b>DEPARTMENT OF PHARMACEUTICAL SCIENCE</b>
<b>Course Handout</b>
Course : PHARMACEUTICAL ORGANIC CHEMISTRY – I PRACTICAL
Course Code : BP208P, Crédits : 02, Session :2023-24 (Even Sem.), Class : B.Pharm. 1st Year
Faculty Name: Dr. Pawan Kumar Gupta

**A. Introduction:** The course is designed to impart skill development in the arts and science of preparing the different conventional dosage forms.

**B. Course Outcomes:** At the end of the course, students will be able to:

**BP208P.1.** Understand the principles of analysis

**BP208P.2.** Operate equipment used in chemical analysis

**BP208P.3.** Carryout various qualitative test for determination of unknown compound.

**BP208P.4.** Carryout various functional group test.

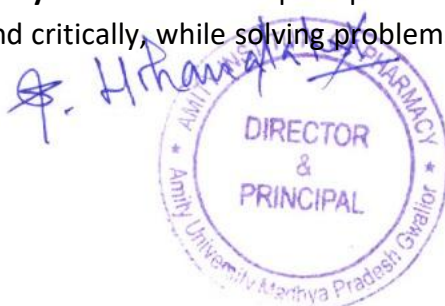
**BP208P.5.** Develop analytical skills

**Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during



daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfilment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

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**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.


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**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**C. Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
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*A. Hirani*  


Continuous Internal Evaluation	Mid Term 1	CT	10%
	Mid Term 2		
	Lab record	LR	1%
	Viva	V	2%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	2%
End Semester Examination	End Semester Examination	EE	35%
<b>Total</b>			<b>50%</b>

#### D. Syllabus

Systematic qualitative analysis of unknown organic compounds like

- Preliminary test: Color, odour, aliphatic/aromatic compounds, saturation and unsaturation, etc.
- Detection of elements like Nitrogen, Sulphur and Halogen by Lassaigne's test
- Solubility test
- Functional group test like Phenols, Amides/ Urea, Carbohydrates, Amines, Carboxylic acids, Aldehydes and Ketones, Alcohols, Esters, Aromatic and Halogenated Hydrocarbons, Nitro compounds and Anilide.
- Melting point/Boiling point of organic compounds
- Identification of the unknown compound from the literature using melting point/ boiling point.
- Preparation of the derivatives and confirmation of the unknown compound by melting point/ boiling point.
- Minimum 5 unknown organic compounds to be analysed systematically.

Preparation of suitable solid derivatives from organic compounds

Construction of molecular models

#### E. Examination Scheme:

Components	A	CT	LR	V	EE
Weightage (%)	2	10	1	2	35

CT: Class Test, LR: Lab Record, V: Viva, EE: End Semester Examination; A: Attendance



**F. Suggested Text/Reference Books:**

A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry Vol I & II, Stahlone Press of University of London

A.I. Vogel, Text Book of Quantitative Inorganic analysis

P. Gundu Rao, Inorganic Pharmaceutical Chemistry

Bentley and Driver's Textbook of Pharmaceutical Chemistry

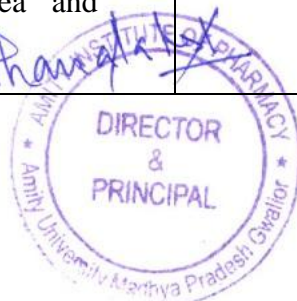
John H. Kennedy, Analytical chemistry principles

Indian Pharmacopoeia.

○ .

**G. Lecture Plan**

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	To determine melting point of the given sample.	Practical	CO1, 2, 4, 5	Mid Term-1, Quiz & End Sem Exam
2	To determine boiling point of the given sample.	Practical	CO1, 2, 4, 5	Mid Term-1, Quiz & End Sem Exam
3	To perform solubility test of given sample.	Practical	CO1, 2, 4, 5	Mid Term-1, Quiz & End Sem Exam
4	To perform preliminary investigation of following organic compound.	Practical	CO1, 2, 4, 5	Mid Term-1, Quiz & End Sem Exam
5	To perform elemental analysis of the given sample.	Practical	CO1, 2, 4, 5	Mid Term-1, Quiz & End Sem Exam
6	To perform identification of functional group in the given sample (Carbohydrate).	Practical	CO1, 2, 4, 5	Mid Term-1, Quiz & End Sem Exam
7	To perform identification of functional group in the given sample (Urea and Thiourea)).	Practical	CO1, 2, 4, 5	Mid Term-1, Quiz & End Sem Exam



8	To perform identification of functional group in the given sample (Carboxylic Acid).	Practical	CO1, 2, 4, 5	Mid Term-2, Quiz & End Sem Exam
9	To perform identification of functional group in the given sample (Phenol).	Practical	CO1, 2, 3, 5	Mid Term-2, Quiz & End Sem Exam
10	To perform identification of functional group in the given sample (Aldehyde)	Practical	CO1, 2, 3, 5	Mid Term-2, Quiz & End Sem Exam
11	To perform identification of functional group in the given sample (Ketone)	Practical	CO1, 2, 3, 5	Mid Term-2, Quiz & End Sem Exam
12	To perform identification of functional group in the given sample (Amine)	Practical	CO1, 2, 4, 5	Mid Term-2, Quiz & End Sem Exam
13	To determine Iodine value of the given sample of castor oil.	Practical	CO1, 2, 4, 5	Mid Term-2, Quiz & End Sem Exam
14	To Synthesize Benzanilide (Benzylaniline) by Bezoylation process.	Practical	CO1, 2, 4, 5	Mid Term-2, Quiz & End Sem Exam
15	To prepare and submit Phenyl Benzoate from Phenol.	Practical	CO1, 2, 4, 5	Mid Term-2, Quiz & End Sem Exam

#### H. Course Articulation Matrix (Mapping of COs with POs)

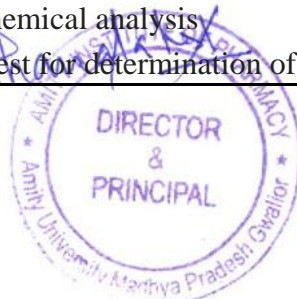
CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES											
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12



<b>BP208P.1</b>	Understand the principles of analysis	3		2	1	2	1	-	2	1	2	1	
<b>BP208P.2.</b>	Operate equipment used in chemical analysis	2	-	-	1	-	1	-	-	-	-	3	
<b>BP208P.3.</b>	Carryout various qualitative test for determination of unknown compound	3	2	2	1	-	2	-	2	-	-	3	
<b>BP208P 4.</b>	Carryout various functional group test.	2	2	2	1	-	2	-	2	-	-	3	
<b>BP208P.5.</b>	Develop analytical skills	1	2	3	-	-	2	-	2	-	-	3	

### Sample Question Paper

Amity Institute of Pharmacy Department of Pharmaceutical Chemistry I MID-SEMESTER (SEM –Ist) 2023-24						
Class: B.Pharm, I Semester						
Subject Name: BP108P Pharmaceutical Organic Chemistry-I Practical		Time: 4 Hrs			Max. Marks: 40	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		
Student will be able to <b>CO.1.</b> Understand the principles of analysis <b>CO.2.</b> Operate equipment used in chemical analysis <b>CO.3.</b> Carryout various qualitative test for determination of unknown compound						



<b>CO.4.</b> Carryout various functional group test.			
<b>CO.5.</b> Develop analytical skills			
CO Map	Question No.	Question	Marks
CO1,2,4	Q.1a	Synopsis- 1. Define Elimination reactions and their types.	2
CO1,2,4	Q.1b	Synopsis- 2. Explain Melting and Boiling Point and its Application.	2
CO1,2,4	Q.1c	Synopsis- Illustrate heterocyclic compounds and give any three examples.	2
CO1,2,4	Q.1d	Synopsis- 3. Discuss Solubility and name the various factors affecting Solubility.	2
CO1,2,4	Q.1e	Synopsis- 4. Define Functional Group and give the example of any three Functional group.	2
CO1,2, 4,5	Q.2	Experiment To perform Solubility test of the given samples of organic compounds.	25
CO1,2,3,4,5	Q.3	Viva	5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**Attainment Level:**

96.5 % Percentage of students secured more than 60% marks, so this course PHARMACEUTICAL ORGANIC CHEMISTRY I – PRACTICAL (BP208T) attained Level 3.





# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

### Programme Outcomes:

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

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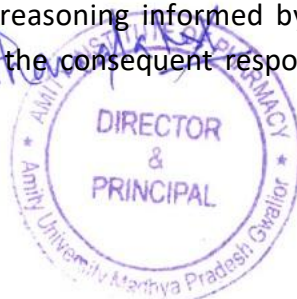
**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

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**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “- “

PROGRAMME ARTICULATION MATRIX																
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
IISE M	BP209P	3	2	3	1	1	2		3		1	2		3	3	3

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# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

<b>DEPARTMENT OF PHARMACEUTICAL CHEMISTRY</b>
<b>Course Handout</b>
Course : BIOCHEMISTRY (Practical)
Course Code : BP209P, Crédits : 02, Session :2023-24 (Even Sem.), Class : B.Pharm. 1st Year
Faculty Name: Dr. Ajay Mahor

**A. Introduction:** Biochemistry deals with complete understanding of the molecular levels of the chemical process associated with living cells. The scope of the subject is providing biochemical facts and the principles to understand metabolism of nutrient molecules in physiological and pathological conditions. It is also emphasizing on genetic organization of mammalian genome and hetero & autocatalytic functions of DNA.

**B. Course Outcomes:** At the end of the course, students will be able to:

**BP209P.1.** Perform various Qualitative analysis of biomolecules i.e. carbohydrates (Glucose, Fructose, Lactose, Maltose, Sucrose and starch), proteins (albumin and Casein).

**BP209P.2.** Learn about the normal constituents of urine, blood and their significance in maintaining good health.

**BP209P.3.** Learn qualitative and quantitative analysis of constituents of biological fluids such as urine, blood and their estimation using standard methods.

**BP209P.4.** Prepare various buffer solution with specific pH Value

**BP209P.5.** Perform various enzymatic activities.

**C. Programme Outcomes:**

**[PO.1].Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2].Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills.



Develop and implement plans and organize work to meet deadlines.

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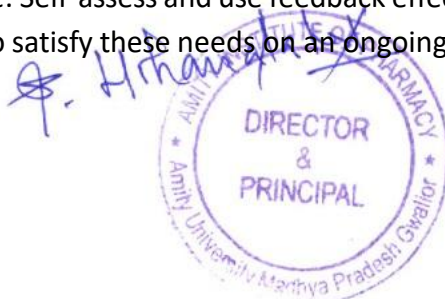
**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

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**D. Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	10%
	Mid Term 2		
	Lab record	LR	1%
	Viva	V	2%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	2%
End Semester Examination	End Semester Examination	EE	35%
<b>Total</b>			<b>50%</b>

**E. Syllabus;**

1. Qualitative analysis of carbohydrates (Glucose, Fructose, Lactose, Maltose, Sucrose and starch)
2. Identification tests for Proteins (albumin and Casein)
3. Quantitative analysis of reducing sugars (DNSA method) and Proteins (Biuret method)
4. Qualitative analysis of urine for abnormal constituents
5. Determination of blood creatinine
6. Determination of blood sugar
7. Determination of serum total cholesterol
8. Preparation of buffer solution and measurement of pH
9. Study of enzymatic hydrolysis of starch
10. Determination of Salivary amylase activity
11. Study the effect of Temperature on Salivary amylase activity.
12. Study the effect of substrate concentration on salivary amylase activity.

**Examination Scheme:**

Components	A	CT	LR	V	EE
<b>Weightage (%)</b>	2	10	1	2	35

CT: Class Test, LR: Lab Record, V: Viva, EE: End Semester Examination; A: Attendance

**F. Suggested Text/Reference Books:**

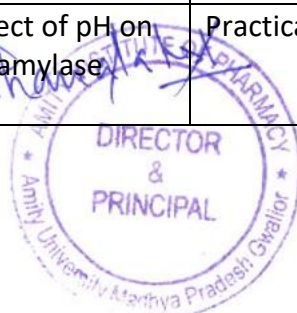
1. Practical Biochemistry by R.C. Gupta and S. Bhargavan.



2. Introduction of Practical Biochemistry by David T. Plummer. (3rd Edition)
3. Practical Biochemistry for Medical students by Rajagopal and Ramakrishna.
4. Practical Biochemistry by Harold Varley
5. Indian Pharmacopoeia

#### G. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	To perform the qualitative analysis of different unknown sample of carbohydrates.	Practical	CO1	Mid Term-1, Quiz & End Sem Exam
2	To perform the qualitative analysis of different unknown sample of carbohydrates.	Practical	CO1	Mid Term-1, Quiz & End Sem Exam
3	To perform the qualitative analysis of different unknown sample of carbohydrates.	Practical	CO1	Mid Term-1, Quiz & End Sem Exam
4	To estimate creatinine in given blood sample.	Practical	CO2,3	Mid Term-1, Quiz & End Sem Exam
5	To perform the identification Test For albumin in given sample.	Practical	CO2,3	Mid Term-1, Quiz & End Sem Exam
6	To prepare carbonate – bicarbonate buffer of pH 10.2	Practical	CO 4	Mid Term-1, Quiz & End Sem Exam
7	To perform qualitative analysis of abnormal constituent of urine Sample.	Practical	CO 2,3	Mid Term-2, Quiz & End Sem Exam
8	To perform qualitative analysis of normal constituent of urine Sample.	Practical	CO2,3	Mid Term-2, Quiz & End Sem Exam
9	To analyze the effect of pH on activity of salivary amylase.	Practical	CO 4,5	Mid Term-2, Quiz & End Sem Exam



				Exam
10	To determine the time needed for hydrolysis of starch in presence of amylase.	Practical	CO 4,5,	Mid Term-2, Quiz & End Sem Exam
11	To determine the protein content of the serum sample	Practical	CO 2,3	Mid Term-2, Quiz & End Sem Exam
12	To determine serum total cholestrol.	Practical	CO 2,3	Mid Term-2, Quiz & End Sem Exam

#### H. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES										
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11
<b>BP209P.1</b>	Perform various Qualitative analysis of biomolecules i.e. carbohydrates (Glucose, Fructose, Lactose, Maltose, Sucrose and starch), proteins (albumin and Casein).	3	-	2	1	2	1	-	2	1	2	1
<b>BP209P.2.</b>	Learn about the normal constituents of urine, blood and their significance in maintaining good health.	2	-	-	1	-	1	-	-	-	-	3



<b>BP209P.3.</b>	Learn qualitative and quantitative analysis of constituents of biological fluids such as urine, blood and their estimation using standard methods	3	2	2	1	-	2	-	2	-	-	3	
<b>BP209P.4.</b>	Prepare various buffer solution with specific pH Value	2	2	2	1	-	2	-	2	-	-	3	
<b>BP209P.5.</b>	Perform various enzymatic activities.	1	2	3	-	-	2	-	2	-	-	3	

### Sample Question Paper

Amity Institute of Pharmacy Department of Pharmaceutical Chemistry IMID-SEMESTER(SEM-II)2023-24						
Class: B.Pharm, II Semester						
Subject Name: BP209P Biochemistry Practical		Time: 4 Hrs			Max. Marks: 40	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,2,5	Q.4,5	Q.3	Q.3, 4		
<p>Student will be able to</p> <p><b>CO.1.</b> Recall different qualitative test for identification of carbohydrates.</p> <p><b>CO.2.</b> perform identification tests of protein in given sample.</p> <p><b>CO.3.</b> Determine the normal and abnormal constituents of urine sample.</p> <p><b>CO.4.</b> analyze the effect of time for the hydrolysis of starch in presence of amylase.</p> <p><b>CO.5.</b> prepare various buffer solution of given pH</p>						
COMap	QuestionNo.	Question				Marks
CO1	Q.1a	Synopsis-Define biochemistry				2
	Q.1b	Synopsis- Define hormones				2



CO5			
CO 2,3	Q.1c	Synopsis- enlist the various constituents of blood	2
CO 1	Q.1d	Synopsis- What is the DNSA method?	2
CO 1	Q.1e	Synopsis- what is Millon's test?	2
CO 2,3,4	Q.2	Experiment To determine the sugar level in the blood sample.	25
CO1,2,3,4,5	Q.3	Viva voce	5

Attainments		Rubric
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

**Attainments: level 3**

97.7% of students secure more than 60% marks, so this course Pharmaceutical Organic Chemistry I- Practical (209P) attained level 3







AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICS

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

### Programme Outcomes:

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

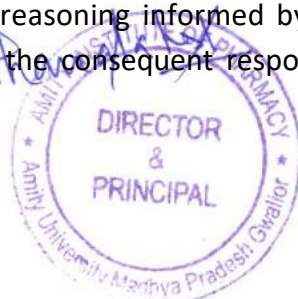
**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.



**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “-”

PROGRAMME ARTICULATION MATRIX																
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
II SEM	BP210P	3	1	2	1	1	2		2		3	2	-	-	-	





# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

<b>DEPARTMENT OF PHARMACEUTICS</b>
<b>Course Handout</b>
Course : COMPUTER APPLICATIONS IN PHARMACY- PRACTICAL
Course Code : BP210P, Crédits : 01, Session :2023-24 (Even Sem.), Class : B.Pharm. 1st Year
Faculty Name: Dr. Shradha Dubey, Ms. Arunima Shivhare

**A. Introduction:** The course is designed to impart skill development in database management.

**B. Course Outcomes:** At the end of the course, students will be able to:

**BP210P.1.** Create and manage databases on the given information

**BP210P.2.** Design a questionnaire using various processing packages to gather information about a particular disease.

**BP210P.3.** Generate, edit and print reports and webpage and XML pages based on patient information.

**BP210P.4.** Explain drug information storage and retrieval system.

**BP210P.5.** Utilize Ms-office, Ms-Access for data management

**C. Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

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**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

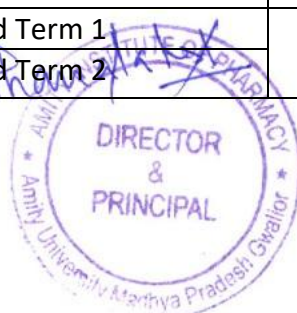
**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**D. Assessment Plan:**

<b>Component of Evaluation</b>	<b>Description</b>	<b>Code</b>	<b>Weightage %</b>
Continuous Internal	Mid Term 1	CT	5%
	Mid Term 2		



Evaluation	Lab record	LR	1%
	Viva	V	2%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	2%
End Semester Examination	End Semester Examination	EE	15%
<b>Total</b>			<b>25%</b>

### E. Syllabus

1. Design a questionnaire using a word processing package to gather information about a particular disease.
2. Create a HTML web page to show personal information.
3. Retrieve the information of a drug and its adverse effects using online tools
4. Creating mailing labels Using Label Wizard, generating label in MS WORD
5. Create a database in MS Access to store the patient information with the required fields Using access
6. Design a form in MS Access to view, add, delete and modify the patient record in the database
7. Generating report and printing the report from patient database
8. Creating invoice table using – MS Access
9. Drug information storage and retrieval using MS Access
10. Creating and working with queries in MS Access
11. Exporting Tables, Queries, Forms and Reports to web pages
12. Exporting Tables, Queries, Forms and Reports to XML pages

### F. Examination Scheme:

Components	A	CT	LR	V	EE
Weightage (%)	2	5	1	2	15

CT: Class Test, LR: Lab Record, V: Viva, EE: End Semester Examination; A: Attendance

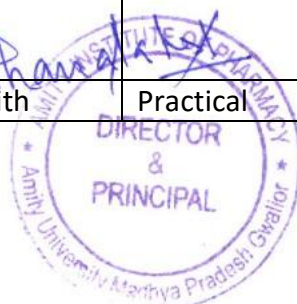
### G. Suggested Text/Reference Books:

1. Computer Application in Pharmacy – William E.Fassett –Lea and Febiger, 600 South Washington Square, USA, (215) 922-1330.
2. Computer Application in Pharmaceutical Research and Development –Sean Ekins – Wiley-Interscience, A John Willey and Sons, INC., Publication, USA
3. Bioinformatics (Concept, Skills and Applications) – S.C.Rastogi-CBS Publishers and Distributors, 4596/1-A, 11 Darya Gani, New Delhi – 110 002(INDIA)



4. Microsoft office Access - 2003, Application Development Using VBA, SQL Server, DAP and Infopath – Cary N.Prague – Wiley Dreamtech India (P) Ltd., 4435/7, Ansari Road, Daryagani, New Delhi – 110002

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Design a questionnaire using a word processing package to gather information about a particular disease.	Practical	CO1, 2	Mid Term-1, Quiz & End Sem Exam
2	Design a questionnaire using a word processing package to gather information about a particular disease.	Practical	CO1, 2	Mid Term-1, Quiz & End Sem Exam
3	Create a HTML web page to show personal information.	Practical	CO3	Mid Term-1, Quiz & End Sem Exam
4	Retrieve the information of a drug using online tools	Practical	CO4	Mid Term-1, Quiz & End Sem Exam
5	Retrieve the information of drug adverse effects using online tools	Practical	CO4	Mid Term-1, Quiz & End Sem Exam
6	Creating mailing labels Using Label Wizard, generating label in MS WORD	Practical	CO5	Mid Term-1, Quiz & End Sem Exam
7	Create a database in MS Access to store the patient information with the required fields using access	Practical	CO1	Mid Term-1, Quiz & End Sem Exam
8	Design a form in MS Access to view, add, delete and modify the patient record in the database	Practical	CO1,5	Mid Term-2, Quiz & End Sem Exam
9	Design a form in MS Access to view, add, delete and modify the patient record in the database	Practical	CO1, 5	Mid Term-2, Quiz & End Sem Exam
10	Generating report and printing the report from patient database	Practical	CO1, 3	Mid Term-2, Quiz & End Sem Exam
11	Creating invoice table using – MS Access	Practical	CO5	Mid Term-2, Quiz & End Sem Exam
12	Drug information storage and retrieval using MS Access	Practical	CO5	Mid Term-2, Quiz & End Sem Exam
13	Creating and working with	Practical	CO5	Mid Term-2, Quiz



	queries in MS Access			& End Sem Exam
14	Exporting Tables, Queries, Forms and Reports to web pages	Practical	CO3	Mid Term-2, Quiz & End Sem Exam
15	Exporting Tables, Queries, Forms and Reports to XML pages	Practical	CO3	Mid Term-2, Quiz & End Sem Exam

## H. Lecture Plan

### I. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES													
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P O 13	P O 14
<b>BP210P.1</b>	Create and manage databases on the given information	2	2	3	3	2	1	-	1	1	1	1	-	-	-
<b>BP210P.2.</b>	Design a questionnaire using various processing packages to gather information about a particular disease	2	1	3	3	1	1	-	1	1	1	1	-	-	-
<b>BP210P.3.</b>	Generate, edit and print reports and webpage and XML pages based on patient information.	2	2	3	3	1	2	-	2	-	-	2	-	-	-
<b>BP210P.4.</b>	Explain drug information storage and retrieval system.	2	2	3	3	1	2	-	2	-	-	2	-	1	-
<b>BP210P.5.</b>	Utilize Ms-office, Ms-Access for data management	2	2	3	3	1	2	-	2	-	1	3	-	1	-



### Sample Question Paper

Amity Institute of Pharmacy Department of Pharmaceutics I MID-SEMESTER (SEM –IIInd) 2023-24						
Class: B.Pharm, II Semester						
Subject Name: BP210P Computer Application in Pharmacy-Practical			Time: 2 Hrs		Max. Marks: 40	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1a,b,c,d,e	Q.3	Q.3	Q.2,5,6	Q.3	Q.2
<p>Student will be able to</p> <p><b>CO.1.</b> Create and manage databases on the given information</p> <p><b>CO.2.</b> Design a questionnaire using various processing packages to gather information about a particular disease.</p> <p><b>CO.3.</b> Generate, edit and print reports and webpage and XML pages based on patient information.</p> <p><b>CO.4.</b> Explain drug information storage and retrieval system.</p> <p><b>CO.5.</b> Utilize Ms-office, Ms-Access for data management</p>						
CO Map	Question No.	Question				Marks
CO5	Q.1a	Synopsis- What is the full form of MS access?				2
CO5	Q.1b	Synopsis- What is the standard font used in MS word?				2
CO1,3	Q.1c	Synopsis- What is the full form of XML?				2
CO5	Q.1d	Synopsis- Which field type will you select if you need to enter long name in MS Access?				2
CO5	Q.1e	Synopsis- What is the Microsoft excel shortcut key to Copy and save a file?				2
CO3	Q.2	Experiment To Create a HTML web page to show patient information.				25
CO1,2,3,4,5	Q.3	Viva				5





Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**Attainments: level :1**

81.8% of students secure more than 60% marks, so this course computer applications in pharmacy- practical (BP210P) attained level 3.





AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### **Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.



**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

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**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

### **Programme Specific Outcomes:**

**PSO 1:** Will be able to design, develop and implement efficient software for a given real life problem.

**PSO 2:** Will be able to apply knowledge of AI, Machine Learning and Data Mining in analyzing big data forextracting useful information from it and for performing predictive analysis.

**PSO 3:** Will be able to design, manage and secure wired/ wireless computer networks for transfer and sharing of information.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “-”



**PROGRAMME ARTICULATION  
MATRIX**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
I SEM																
II SEM																
III SEM	BP301T	2	-	2	-	1	2	2	1	1	-	2		1	1	-
	-															

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Dr. Himanshu



AMITY INSTITUTE OF PHARMACY  
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 &  
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 Amity University, Mathya Pradesh, Gwalior



# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

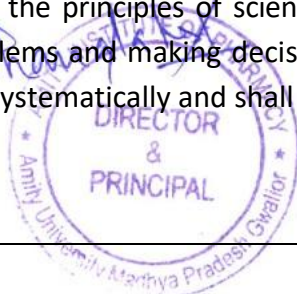
### Course Handout

Course : PHARMACEUTICAL ORGANIC CHEMISTRY – II THEORY

Course Code : BP 301T, Crédits : 04, Session : 2023-24 (Odd Sem.), Class : B.Pharm. II nd Year

Faculty Name: Dr. Pawan Kumar Gupta

- A. Introduction:** The course is designed to impart fundamental knowledge on the preparatory pharmacy with arts and science of preparing the different conventional dosage forms.
- B. Course Outcomes:** At the end of the course, students will be able to:
- BP301T.1.** Relate pharmacy education with pharmacy career options.
- BP301T.2.** Classify the different types of *organic compounds* based on medicinal use.
- BP301T.3.** Experiment in the preparation of various types organic compounds and their derivatives.
- BP301T.4.** Able to analyse and also to *write the structure, name and the type of isomerism of the organic compound*.
- BP301T.5.** Able to Solve and write *the reaction, name the reaction and also orientation of reactions* in different types of *organic compounds*
- Programme Outcomes:**
- [PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
- [PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
- [PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.



**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

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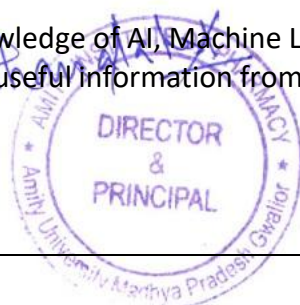
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### C. Programme Specific Outcomes:

**PSO 1:** Will be able to design, develop and implement efficient software for a given real life problem.

**PSO 2:** Will be able to apply knowledge of AI, Machine Learning and Data Mining in analyzing big data for extracting useful information from it and for performing predictive analysis.



**PSO 3:** Will be able to design, manage and secure wired/ wireless computer networks for transfer and sharing of information.

**D. Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	3%
	Student – Teacher interaction	S-T I	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

**E. Syllabus**

**UNIT – I Benzene and its derivatives**

Analytical, synthetic and other evidences in the derivation of structure of benzene, Orbital picture, resonance in benzene, aromatic characters, Huckel's rule Reactions of benzene - nitration, sulphonation, halogenation- reactivity, Friedelcrafts alkylation- reactivity, limitations, Friedelcrafts acylation. Substituents, effect of substituents on reactivity and orientation of mono substituted benzene compounds towards electrophilic substitution reaction Structure and uses of DDT, Saccharin, BHC and Chloramine

**UNIT – II**

**Phenols\*** - Acidity of phenols, effect of substituents on acidity, qualitative tests, Structure and uses of phenol, cresols, resorcinol, naphthols **Aromatic Amines\*** - Basicity of amines, effect of substituents on basicity, and synthetic uses of aryl diazonium salts **Aromatic Acids\*** Acidity, effect of substituents on acidity and important reactions of benzoic acid





### **UNIT – III Fats and Oil**

Fatty acids reaction Hydrolysis, Hydrogenation, Saponification and Rancidity of oils, Drying oils. Analytical constants – Acid value, Saponification value, Ester value, Iodine value, Acetyl value, Reichert Meissl (RM) value- significance and principle involved in their determination.

### **UNIT – IV Polynuclear hydrocarbons:**

Synthesis, reactions Structure and medicinal uses of Naphthalene, Phenanthrene, Anthracene, Diphenylmethane, Triphenylmethane and their derivatives.

### **UNIT – V Cyclo alkanes\***

Stabilities – Baeyer's strain theory, limitation of Baeyer's strain theory, Coulson and Moffitt's modification, Sachse Mohr's theory (Theory of strainless rings), reactions of cyclopropane and cyclobutane only

*S. H. H. H.*



DIRECTOR  
&  
PRINCIPAL

**F. Examination Scheme:**

Components	A	CT	S/V/Q/HA	STI	EE
Weightage (%)	4	15	3	3	75

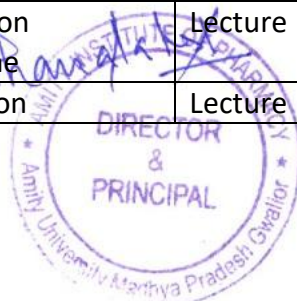
CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination; A: Attendance

**G. Suggested Text/Reference Books:**

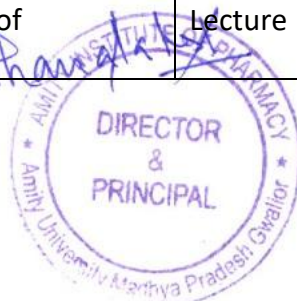
- Organic Chemistry by Morrison and Boyd.
- Organic Chemistry by I.L. Finar, Volume-I
- Textbook of Organic Chemistry by B.S. Bahl & Arun Bahl.
- Organic Chemistry by P.L.Soni.
- Practical Organic Chemistry by Mann and Saunders.
- Vogel's text book of Practical Organic Chemistry.
- Advanced Practical organic chemistry by N.K.Vishnoi.

**H. Lecture Plan**

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Analytical, evidences in the derivation of structure of benzene.	Lecture	CO1,4	Mid Term-1, Quiz & End Sem Exam
2	Synthetic and other evidences in the derivation of structure of benzene.	Lecture	CO1,4	Mid Term-1, Quiz & End Sem Exam
3	Orbital picture, resonance in benzene.	Lecture	CO1,4	Mid Term-1, Quiz & End Sem Exam
4	Aromatic characters, Hückel's rule of benzene.	Tutorial	CO1,4	Mid Term-1, Quiz & End Sem Exam
5	Nitration Reactions of benzene	Lecture	CO1,2	Mid Term-1, Quiz & End Sem Exam
6	Sulfonation Reactions of benzene	Lecture	CO1,2	Mid Term-1, Quiz & End Sem Exam
7	Halogenation Reactions of benzene	Lecture	CO1,2	Mid Term-1, Quiz & End Sem Exam
8	Friedel Craft Alkylation Reactions of benzene	Tutorial	CO1,3	Mid Term-1, Quiz & End Sem Exam
9	Friedel Craft Acylation Reactions of benzene	Lecture	CO1,2	Mid Term-1, Quiz & End Sem Exam
10	Substituents effect on	Lecture	CO1,3	Mid Term-1, Quiz



	Reactivity and orientation of benzene.			& End Sem Exam
11	Quiz	Lecture	CO1,4	Mid Term-1, Quiz & End Sem Exam
12	Structure and uses of D.D.T.	Tutorial	CO1,4	Mid Term-1, Quiz & End Sem Exam
13	Structure and uses of Saccharin.	Lecture	CO1,4	Mid Term-1, Quiz & End Sem Exam
14	Structure and uses of BHC.	Lecture	CO1,4	Mid Term-1, Quiz & End Sem Exam
15	Structure and uses of Chloramine.	Lecture	CO1,4	Mid Term-1, Quiz & End Sem Exam
16	Unit test	Tutorial		Mid Term-1, Quiz & End Sem Exam
17	Method of preparation and reaction Reaction of Phenol	Lecture	CO1,5	Mid Term-1, Quiz & End Sem Exam
18	Acidity of phenols. Effect of substituents on acidity	Lecture	CO1,3	Mid Term-1, Quiz & End Sem Exam
19	Qualitative tests of Phenol	Lecture	CO1,3	Mid Term-1, Quiz & End Sem Exam
20	Structure and uses of phenol	Tutorial	CO1,4	Mid Term-1, Quiz & End Sem Exam
21	Structure and uses of cresol	Lecture	CO1,4	Mid Term-1, Quiz & End Sem Exam
22	Structure and uses of resorcinol	Lecture	CO1,4	Mid Term-1, Quiz & End Sem Exam
23	Structure and uses of naphthol	Lecture	CO1,4	Mid Term-1, Quiz & End Sem Exam
24	Quiz	Tutorial		Mid Term-1, Quiz & End Sem Exam
25	Method of preparation and reaction Reaction of amine	Lecture	CO1,5	Mid Term-1, Quiz & End Sem Exam
26	Basicity of amine. Effect of substituents on Basicity	Lecture	CO1,3	Mid Term-1, Quiz & End Sem Exam
27	synthetic uses of aryl diazonium salt	Lecture	CO1,5	Mid Term-1, Quiz & End Sem Exam
28	Method of preparation and reaction Reaction of aromatic acid	Tutorial	CO1,5	Mid Term-1, Quiz & End Sem Exam
29	Acidity of aromatic acid Effect of substituents on acidity	Lecture	CO1,3	Mid Term-1, Quiz & End Sem Exam
30	Important reaction of Benzoic acid	Lecture	CO1,5	Mid Term-1, Quiz & End Sem Exam



31	Fats and Oils Definition, Properties and Classification	Lecture	CO1,2	Mid Term-2, Quiz & End Sem Exam
32	Fats and Oils Nomenclature	Tutorial	CO1,2	Mid Term-2, Quiz & End Sem Exam
33	Fatty acids – reactions. Hydrolysis	Lecture	CO1,5	Mid Term-2, Quiz & End Sem Exam
34	Fatty acids – reactions, Hydrogenation	Lecture	CO1,5	Mid Term-2, Quiz & End Sem Exam
35	Saponification and Rancidity of oils	Lecture	CO1,5	Mid Term-2, Quiz & End Sem Exam
36	Seminar	Tutorial	CO1,5	Mid Term-2, Quiz & End Sem Exam
37	Drying of oil Analytical constants: Acetyl value	Lecture	CO1,5	Mid Term-2, Quiz & End Sem Exam
38	Analytical constants: Acid value	Lecture	CO1,5	Mid Term-2, Quiz & End Sem Exam
39	Analytical constants: Saponification value	Lecture	CO1,5	Mid Term-2, Quiz & End Sem Exam
40	Unit test	Tutorial	CO1,5	Mid Term-2, Quiz & End Sem Exam
41	Analytical constants: Iodine value	Lecture	CO1,5	Mid Term-2, Quiz & End Sem Exam
42	Analytical constants: Ester value , Reichert Meissl (RM) value	Lecture	CO1,5	Mid Term-2, Quiz & End Sem Exam
43	Polycyclic Aromatic Hydrocarbons, Classification.	Lecture	CO1,3	Mid Term-2, Quiz & End Sem Exam
44	Seminar	Tutorial	CO1,3	Mid Term-2, Quiz & End Sem Exam
45	Preparation, Reactions and derivative of biphenyl.	Lecture	CO1,4	Mid Term-2, Quiz & End Sem Exam
46	Synthesis and reactions of Naphthalene.	Lecture	CO1,5	Mid Term-2, Quiz & End Sem Exam

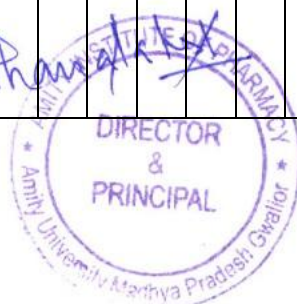


47	Synthesis and reactions of anthracene.	Lecture	CO1,5	Quiz & End Sem Exam
48	Quiz	Tutorial		Quiz & End Sem Exam
49	<i>Synthesis and reactions of Phenanthrene</i>	Lecture	CO1,5	Quiz & End Sem Exam
50	Structure and medicinal uses of Naphthalene.	Lecture	CO1,4	Quiz & End Sem Exam
51	Structure and medicinal uses of Phenanthrene.	Lecture	CO1,4	Quiz & End Sem Exam
52	<i>Structure and medicinal uses of Diphenylmethane and Triphenylmethane</i>	Tutorial	CO1,4	Quiz & End Sem Exam
53	<i>Preparation, Reaction of Cyclo alkanes.</i>	Lecture	CO1,4	Quiz & End Sem Exam
54	Baeyer's strain theory.	Lecture	CO1,2	Quiz & End Sem Exam
55	Limitation of Baeyer's strain theory.	Lecture	CO1,3	Quiz & End Sem Exam
56	Unit test	Tutorial		Quiz & End Sem Exam
57	Coulson and Moffitt's modification.	Lecture	CO1,2	Quiz & End Sem Exam
58	Sachse Mohr's theory.	Lecture	CO1,2	Quiz & End Sem Exam
59	Reactions of cyclopropane.	Lecture	CO1,2	Quiz & End Sem Exam
60	<i>Reactions of cyclobutane</i>	Tutorial	CO1,2	Quiz & End Sem Exam

*A. Hirani*  

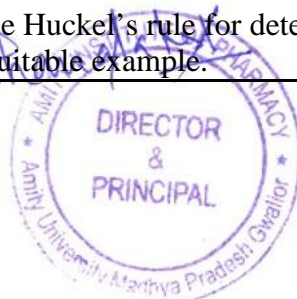

### I. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
BP301T.1	Relate pharmacy education with pharmacy career options.	2	-	-	-	2	2	1	-	1	-	-	-	1	1	-
BP103T.2.	Classify the different types of <i>organic compounds</i> based on medicinal use.	3	-	-	1	-	2	-	-	-	-	3	-	1	1	-
BP103T.3.	Experiment in the preparation of various types organic compounds and their derivatives.	3	2	-	3	-	2	-	-	-	-	3	-	1	1	-
BP103T.4.	Able to analyse and also to <i>write the structure, name and the type of isomerism of the organic compound.</i>	2	2	3	3	-	1	-	-	-	-	3	-	1	1	-
BP103T.5.	Able to Solve and <i>write the reaction, name the reaction and also orientation of reactions in different types of organic compounds</i>	1	-	3	-	-	-	-	-	-	-	3	-	1	1	-



**Sample Question Paper**

Amity Institute of Pharmacy Department of Pharmaceutical Chemistry I MID-SEMESTER (SEM –III rd) 2023-24						
Class: B.Pharm, III Semester						
Subject Name: BP301T Pharmaceutical Organic Chemistry-II Theory		Time: 1 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4,5	Q.2,3,6,8,9	Q.4,7	Q.2,5,		
Student will be able to CO1: List the broad perceptive of cloud architecture and model. CO2: Apply different cloud programming models as per need.						
CO Map	Question No.	Question				Marks
CO1	Q.1	List down the various electrophilic substitution reactions given by benzene.				2
CO1	Q.2	List the Structure and any three uses of benzoic acid.				2
CO2	Q.3	Discuss the three methods of preparation for carboxylic acid.				2
CO2	Q.4	Show the Structure and any three uses of DDT.				2
CO2	Q.5	List the any three reactions given by Phenol.				2
	Q.6	Explain Halogenation reactions with mechanism given by benzene.				10
CO1	Q.7	Discuss acidity of Phenol or carboxylic acid with substituents effect on it.				10
CO1	Q.8	Outline Huckel's rule for determination of aromaticity with suitable example.				5



CO2	Q.9	Discuss Nitration of Benzene with mechanism.	5
<b>Attainments</b>		<b>Rubric</b>	
<b>Level</b>	1	IF 60% of students secure more than 60% marks then level 1	
<b>Level</b>	2	IF 70% of students secure more than 60% marks then level 2	
<b>Level</b>	3	IF 80% of students secure more than 60% marks then level 3	

**Attainment Level:**

52.17 % Percentage of students secured more than 60% marks, so this course PHARMACEUTICAL ORGANIC CHEMISTRY II – THEORY (BP301T) not attained any Level.







# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

**AMITY UNIVERSITY MADHYA PRADESH, GWALIOR**

**AMITY INSTITUTE OF PHARMACY**

**DEPARTMENT OF PHARMACEUTICS**

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

#### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

#### Programme Outcomes:

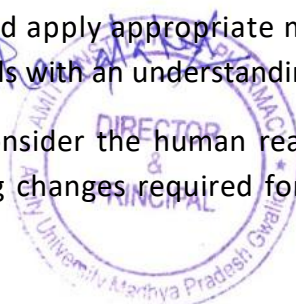
**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional



and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “-”



**PROGRAMME ARTICULATION  
MATRIX**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
III SEM																
	BP302T	3	-	3	2	-	-	2	1	1	2	2	-	3	2	-




## DEPARTMENT OF PHARMACEUTICS

### Course Handout

Course : PHYSICAL PHARMACEUTICS – I THEORY

Course Code : BP302T, Crédits : 04, Session : 2023-24 (Odd Sem.), Class : B.Pharm. 3rd Year

Faculty Name: Dr. M.Prathap

**A. Scope:** The course deals with the various physical and physicochemical properties, and principle involved in dosage forms/formulations. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.

**B. Course Outcome: *At the end of each course, the student will be able to:***

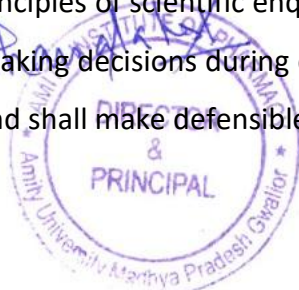
<b>C302.1</b>	Write the importance of solubility in designing of dosage forms and principles of diffusion in biological systems.
<b>C302.2</b>	Classify the states of matter and understand the applications of various physiochemical properties to design dosage forms
<b>C302.3</b>	Explain the principles of interfacial tension and the applications of surface active agents in drug solubilization
<b>C302.4</b>	Make use of concepts of complexation and protein binding in pharmacy
<b>C302.5</b>	Function of pH, buffers and their use in the stabilization of pharmaceutical formulations.

**C. Programme Outcomes:**

[PO.1]. Pharmacy Knowledge: Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

[PO.2]. Planning Abilities: Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

[PO.3]. Problem analysis: Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.



[PO.4]. Modern tool usage: Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

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#### D. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2 quiz, assignment, open book test, field work, group discussion and seminar)		
	Seminar/ Assignment/Quiz/ Open book test	S/As/Q/OBT	3%
Interaction	Student-Teacher interaction	ST	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

#### F. Syllabus

##### UNIT-I

Solubility of drugs: Solubility expressions, mechanisms of solute solvent interactions, ideal solubility parameters, solvation & association, quantitative approach to the factors influencing solubility of drugs, diffusion principles in biological systems. Solubility of gas in liquids, solubility of liquids in liquids, (Binary solutions, ideal solutions) Raoult's law, real solutions. Partially miscible liquids, Critical solution temperature and applications. Distribution law, its limitations and applications

##### UNIT-II

States of Matter and properties of matter: State of matter, changes in the state of matter, latent heats, vapor pressure, sublimation critical point, eutectic mixtures, gases, aerosols–inhalers, relative humidity, liquid complexes, liquid crystals, glassy states, solid crystalline, amorphous & polymorphism.

Physicochemical properties of drug molecules: Refractive index, optical rotation, dielectric constant, dipole moment, dissociation constant, determinations and applications

##### UNIT-III

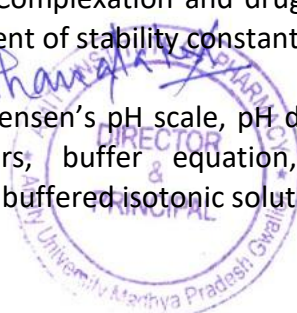
Surface and interfacial phenomenon: Liquid interface, surface & interfacial tensions, surface free energy, measurement of surface & interfacial tensions, spreading coefficient, adsorption at liquid interfaces, surface active agents, HLB Scale, solubilization, detergency, adsorption at solid interface.

##### UNIT-IV

Complexation and protein binding: Introduction, Classification of Complexation, Applications, methods of analysis, protein binding, Complexation and drug action, crystalline structures of complexes and thermodynamic treatment of stability constants.

##### UNIT-V 07 Hours

pH, buffers and Isotonic solutions: Sorensen's pH scale, pH determination (electrometric and calorimetric), applications of buffers, buffer equation, buffer capacity, buffers in pharmaceutical and biological systems, buffered isotonic solutions.



### G. Examination Scheme:

Components	A	ST	CT	S/As/Q/OBT	EE
Weightage (%)	4	3	15	3	75

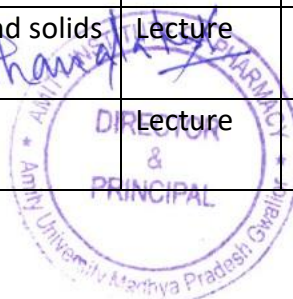
CT: Class Test, As: Assignment, ST: Student teacher interaction, S/A/Q/OBT: Seminar/ Assignment/Quiz/ Open book test, EE: End Semester Examination; A: Attendance

### H. Suggested Text/Reference Books:

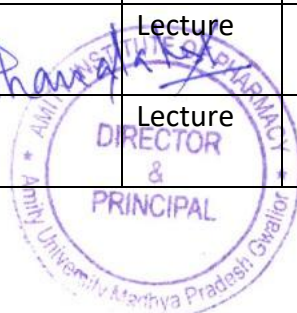
1. Physical Pharmacy by Alfred Martin
2. Experimental Pharmaceutics by Eugene, Parott.
3. Tutorial Pharmacy by Cooper and Gunn.
4. Stocklosam J. Pharmaceutical Calculations, Lea &Febiger, Philadelphia.
5. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, MarcelDekkar Inc.
6. Liberman H.A, Lachman C, Pharmaceutical Dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc.
7. Physical Pharmaceutics by Ramasamy C and ManavalanR.
8. Laboratory Manual of Physical Pharmaceutics, C.V.S. Subramanian, J. Thimma settee
9. Physical Pharmaceutics by C.V.S. Subramanyam

### I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction, Solvent-solute interactions	Lecture	BP302T.1	Mid Term-1, Quiz & End Sem Exam
2	Solubility of gas in liquids	Lecture	BP302T.1	Mid Term-1, Quiz & End Sem Exam
3	Solubility of liquids in liquids and solids in liquids	Lecture	BP302T.1	Mid Term-1, Quiz & End Sem Exam
4	Distribution of solutes in solvents	Lecture	BP302T.1	Mid Term-1, Quiz & End Sem Exam
5	Fick's first law and second law	Lecture	BP302T.1	Mid Term-1, Quiz & End Sem Exam
6	Raoult's law, real solutions	Lecture	BP302T.1	Mid Term-1, Quiz & End Sem Exam
7	Partially miscible liquids	Lecture	BP302T.1	Mid Term-1, Quiz & End Sem Exam
8	Critical solution temperature and applications	Lecture	BP302T.1	Mid Term-1, Quiz & End Sem Exam
9	Solubility of liquids in liquids and solids in liquids	Lecture	BP302T.1	Mid Term-1, Quiz & End Sem Exam
10	Fick's first law and second law	Lecture	BP302T.1	Mid Term-1, Quiz & End Sem Exam

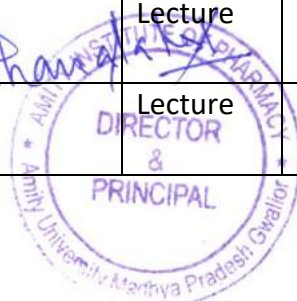


11	mechanisms of solute solvent interactions,	Lecture	BP302T.1	Mid Term-1, Quiz & End Sem Exam
12	mechanisms of solute solvent interactions,	Lecture	BP302T.1	Mid Term-1, Quiz & End Sem Exam
13	States of Matter and properties of matter: State of matter	Lecture	BP302T.2	Mid Term-1, Quiz & End Sem Exam
14	changes in the state of matter	Lecture	BP302T.2	Mid Term-1, Quiz & End Sem Exam
15	changes in the state of matter	Lecture	BP302T.2	Mid Term-1, Quiz & End Sem Exam
16	latent heats, vapor pressure	Lecture	BP302T.2	Mid Term-1, Quiz & End Sem Exam
17	sublimation critical point, eutectic mixtures	Lecture	BP302T.2	Mid Term-1, Quiz & End Sem Exam
18	sublimation critical point, eutectic mixtures	Lecture	BP302T.2	Mid Term-1, Quiz & End Sem Exam
19	Refractive index, optical rotation,	Lecture	BP302T.2	Mid Term-1, Quiz & End Sem Exam
20	optical rotation, dielectric constant	Lecture	BP302T.2	Mid Term-1, Quiz & End Sem Exam
21	dielectric constant, optical rotatory dispersion	Lecture	BP302T.2	Mid Term-1, Quiz & End Sem Exam
22	optical rotatory dispersion	Lecture	BP302T.2	Mid Term-1, Quiz & End Sem Exam
23	Liquid interface, surface & interfacial tensions	Lecture	BP302T.3	Mid Term-1, Quiz & End Sem Exam
24	Liquid interface, surface & interfacial tensions	Lecture	BP302T.3	Mid Term-1, Quiz & End Sem Exam
25	surface free energy	Lecture	BP302T.3	Mid Term-1, Quiz & End Sem Exam
26	measurement of surface & interfacial tensions	Lecture	BP302T.3	Mid Term-1, Quiz & End Sem Exam
27	measurement of surface & interfacial tensions	Lecture	BP302T.3	Mid Term-1, Quiz & End Sem Exam
28	measurement of surface & interfacial tensions	Lecture	BP302T.3	Mid Term-2, Quiz & End Sem Exam
29	spreading coefficient	Lecture	BP302T.3	Mid Term-2, Quiz & End Sem Exam
30	spreading coefficient	Lecture	BP302T.3	Mid Term-2, Quiz & End Sem Exam
31	adsorption at liquid interfaces,	Lecture	BP302T.3	Mid Term-2, Quiz & End Sem Exam
32	adsorption at liquid interfaces,	Lecture	BP302T.3	Mid Term-2, Quiz & End Sem Exam





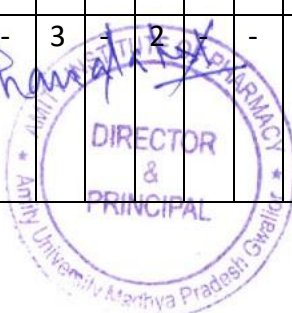
33	adsorption at liquid interfaces,	Lecture	BP302T.3	Mid Term-2, Quiz & End Sem Exam
34	surface active agents	Lecture	BP302T.3	Mid Term-2, Quiz & End Sem Exam
35	HLB Scale, solubilization, detergency,	Lecture	BP302T.3	Mid Term-2, Quiz & End Sem Exam
36	adsorption at solid interface	Lecture	BP302T.3	Mid Term-2, Quiz & End Sem Exam
37	adsorption at solid interface	Lecture	BP302T.3	Mid Term-2, Quiz & End Sem Exam
38	Complexation and protein binding: Introduction,	Lecture	BP302T.4	Mid Term-2, Quiz & End Sem Exam
39	Classification of Complexation	Lecture	BP302T.4	Mid Term-2, Quiz & End Sem Exam
40	Classification of Complexation	Lecture	BP302T.4	Mid Term-2, Quiz & End Sem Exam
41	Classification of Complexation	Lecture	BP302T.4	Mid Term-2, Quiz & End Sem Exam
42	methods of analysis,	Lecture	BP302T.4	Mid Term-2, Quiz & End Sem Exam
43	methods of analysis	Lecture	BP302T.4	Mid Term-2, Quiz & End Sem Exam
44	methods of analysis	Lecture	BP302T.4	Mid Term-2, Quiz & End Sem Exam
45	protein binding	Lecture	BP302T.4	Mid Term-2, Quiz & End Sem Exam
46	protein binding	Lecture	BP302T.4	Mid Term-2, Quiz & End Sem Exam
47	Complexation and drug action	Lecture	BP302T.4	Mid Term-2, Quiz & End Sem Exam
48	Complexation and drug action	Lecture	BP302T.4	Mid Term-2, Quiz & End Sem Exam
49	crystalline structures of complexes	Lecture	BP302T.4	Mid Term-2, Quiz & End Sem Exam
50	Sorensen's pH scale	Lecture	BP302T.5	Mid Term-2, Quiz & End Sem Exam
51	pH determination (electrometric and calorimetric)	Lecture	BP302T.5	Mid Term-2, Quiz & End Sem Exam
52	pH determination (electrometric and calorimetric)	Lecture	BP302T.5	Mid Term-2, Quiz & End Sem Exam
53	applications of buffers	Lecture	BP302T.5	Mid Term-2, Quiz & End Sem Exam
54	buffer equation	Lecture	BP302T.5	Mid Term-2, Quiz & End Sem Exam



55	buffer equation, buffer capacity,	Lecture	BP302T.5	Mid Term-2, Quiz & End Sem Exam
56	buffer capacity, buffers in pharmaceutical and biological systems	Lecture	BP302T.5	Mid Term-2, Quiz & End Sem Exam
57	buffered isotonic solutions	Lecture	BP302T.5	Mid Term-2, Quiz & End Sem Exam
58	buffered isotonic solutions	Lecture	BP302T.5	Mid Term-2, Quiz & End Sem Exam
59	buffered isotonic solutions	Lecture	BP302T.5	Mid Term-2, Quiz & End Sem Exam
60	buffered isotonic solutions	Lecture	BP302T.5	Mid Term-2, Quiz & End Sem Exam

### I. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
<b>BP302T.1</b>	Write the importance of solubility in designing of dosage forms and principles of diffusion in biological systems	3	-	2	2	-	1	-	-	1	-	-		3	2	-
<b>BP302T.2</b>	Classify the states of matter and understand the applications of various physiochemical properties to design dosage forms	3	-	2	2	-	1	-	-	1	-	-		3	2	-
<b>BP302T.3</b>	Explain the principles of interfacial tension and the	3	2	-	3	2	-	-	-	-	-	3		3	2	-



	applications of surface active agents in drug solubilization															
<b>BP302T.4</b>	Make use of concepts of complexation and protein binding in pharmacy.	2	2	3	3	-	1	-	-	-	-	3		3	2	-
<b>BP302T.5</b>	Function of pH, buffers and their use in the stabilization of pharmaceutical formulations.	2	2	3	3	-	1	-	-	-	-	3		3	2	-

### Sample Question Paper

Amity Institute of Pharmacy Department of Pharmaceutics I MID-SEMESTER (SEM –Ist) 2023-24						
Class: B.Pharm, III Semester						
Subject Name: BP 302T Physical Pharmaceutics-I Theory		Time: 1 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,2,3	Q.4,5, 10	Q.6,7	Q. 9,	Q.8,10	
The student will be able to C302.1 Write the importance of solubility in designing of dosage forms and principles of diffusion in biological systems. C302.2 Classify the states of matter and understand the applications of various physiochemical properties to design dosage forms C302.3 Explain the principles of interfacial tension and the applications of surface active agents in drug solubilization C302.4 Make use of concepts of complexation and protein binding in pharmacy C302.5 Function of pH, buffers and their use in the stabilization of pharmaceutical formulations.						
CO Map	Question No.	Question				Marks
CO2	Q.1	What is Eutectic mixture? And write one example				2

CO1	Q.2	Define latent heat	2
CO3	Q.3	What is nematic and Colesteric liquid crystal?	2
CO5	Q.4	Define polymorphism with example	2
CO2	Q.5	Define optical rotation and optical active substances.	2
CO1	Q.6	List out physical properties of drug molecules. Describe any two of them with suitable example and Applications	10
CO1	Q.7	Explain the term solubility, brief out the factors influencing solubility of solid in liquids and gas in liquids	10
CO2	Q.8	Write the methods to achieve liquefaction of gases with neat labeled diagram	5
CO4	Q.9	Give the principle and working of Dunouy's tensiometer and capillary rise method.	5
CO1	Q.10	Explain in detail about steady state diffusion and derive Fick's first law.	5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**No Attainment Level:**

20 % Percentage of students secured more than 60% marks, so this course PHYSICAL PHARMACEUTICS I – THEORY (BP302T) not attained any Level.





AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACOLOGY

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

#### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To equip graduates with a strong foundation in microbiology, pharmacology, and pharmaceutical sciences, enabling them to understand and apply microbiological principles in drug discovery, development, and quality control.

**PEO 2:** To foster the ability to engage in research, utilize advanced microbiological techniques, and contribute to innovations in pharmaceutical microbiology, particularly in the development of new antimicrobial agents and biopharmaceuticals.

**PEO 3:** To develop graduates' skills in critical thinking, problem-solving, and decision-making in areas such as infection control, drug safety, and the design of microbial-based therapeutic solutions.

**PEO 4:** To instill in students a strong sense of professional ethics, teamwork, and communication skills, ensuring they are prepared for leadership roles and can contribute responsibly to the pharmaceutical and healthcare industries.

#### Programme Outcomes:

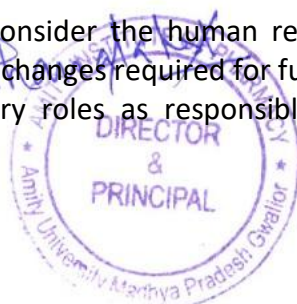
**[PO.1]. Pharmacy Knowledge:** Posses knowledge and compression of the core and basic knowledge assocoited with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team -building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when



appropriate to facilitate improvement in health and well-being.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be able to apply microbiological techniques and methodologies to analyze and control microbial contamination in pharmaceutical products, ensuring safety and efficacy in drug production and development.

**PSO 2:** The graduates will be capable of designing and developing antimicrobial agents, vaccines, and biopharmaceuticals by understanding the interactions between microorganisms and drugs, contributing to effective treatment of infectious diseases.

**PSO 3:** The graduates will be proficient in adhering to regulatory guidelines and quality assurance practices in the pharmaceutical industry, ensuring compliance with standards for microbiological testing, sterilization, and hygiene in drug manufacturing processes.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “-”



PROGRAMME ARTICULATION MATRIX																	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
III SEM																	
	BP303T	3	3	2	1	2	3	2	1	1	3	1					
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	



# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

<b>DEPARTMENT OF PHARMACOLOGY</b>
<b>Course Handout</b>
Course : PHARMACEUTICAL MICROBIOLOGY (Theory)
Course Code : BP303T, Credits : 04, Session : 2023-24 (Odd Sem.), Class : B. Pharm. 2nd Year
Faculty Name : Mrs. Monika Kaushik

**A. Introduction:** This subject is designed to provide fundamental knowledge on various aspects of microbiology, which involves the study of organisms invisible to the naked eye. Microbiology plays a crucial role in medicine and impacts fields such as agriculture, food science, ecology, genetics, biochemistry, and immunology.

**B. Course Outcomes:** At the end of the course, students will be able to:

**BP303T.1.** Understand the methods involved in the identification, cultivation, and preservation of various microorganisms.

**BP303T.2.** Importance of sterilization in microbiology. and pharmaceutical industry

**BP303T.3.** Learn sterility testing of pharmaceutical products.

**BP303T.4.** Microbiological standardization of Pharmaceuticals.

**BP303T.5.** Understand the cell culture technology and its applications in pharmaceutical industries.

**C. Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Posses knowledge and compression of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.





**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team -building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well- being.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

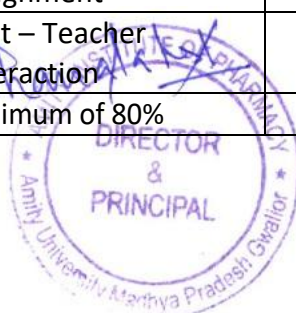
**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self- assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### D. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva- Voce/Quiz/Home Assignment	S/V/Q/HA	3%
	Student – Teacher interaction	S-T I	3%
Attendance	A minimum of 80%	A	4%



	Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.		
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

Q: Quiz, A: Assignment, OBT: Open book test, FW: Field work, GD: Group discussion, S: Seminar

### E. Syllabus

#### Unit I.

**Introduction, history of microbiology:** Its branches, scope and its importance. a) Introduction to Prokaryotes and Eukaryotes. b) Study of ultra-structure and morphological classification of bacteria, nutritional requirements, raw materials used for culture media and physical parameters for growth, growth curve, isolation and preservation methods for pure cultures, cultivation of anaerobes, quantitative measurement of bacterial growth (total & viable count). c) Study of different types of phase contrast microscopy, dark field microscopy and electron microscopy.

#### Unit II.

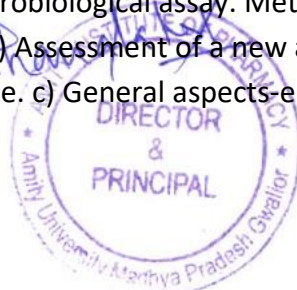
**Identification of bacteria & sterilization techniques:** a) Identification of bacteria using staining techniques (simple, Gram's & Acid fast staining) and biochemical tests (IMViC). b) Study of principle, procedure, merits, demerits and applications of Physical, chemical and mechanical method of sterilization. c) Evaluation of the efficiency of sterilization methods. d) Equipments employed in large scale sterilization. Sterility indicators.

#### Unit III.

**Fungi & Viruses:** a) Study of morphology, classification, reproduction/replication and cultivation of Fungi and Virus. b) Classification and mode of action of disinfectants. c) Factors influencing disinfection, antiseptics and their evaluation. For bacteriostatic and bactericidal actions. d) Evaluation of bactericidal & Bacteriostatic. e) Sterility testing of products (solids, liquids, ophthalmic and other sterile products) according to IP, BP and USP.

#### Unit IV.

**Aseptic area:** Designing of aseptic area, laminar flow equipments; study of different sources of contamination in an aseptic area and methods of prevention, clean area classification. a) Principles and methods of different microbiological assay. Methods for standardization of antibiotics, vitamins and amino acids. b) Assessment of a new antibiotic and testing of antimicrobial activity of a new substance. c) General aspects-environmental cleanliness.



## Unit V.

**Microbial spoilage and Preservation of pharmaceutical products:** a). Types of spoilage, factors affecting the microbial spoilage of pharmaceutical products, sources and types of microbial contaminants, assessment of microbial contamination and spoilage. b) Preservation of pharmaceutical products using antimicrobial agents, evaluation of microbial stability of formulations. c) Growth of animal cells in culture, general procedure for cell culture, Primary, established and transformed cell cultures. d) Application of cell cultures in pharmaceutical industry and research.

### Examination Scheme:

Components	CT	A	Q/A/OBT/FW/GD/S	STI	EE
Weightage (%)	15	4	3	3	75

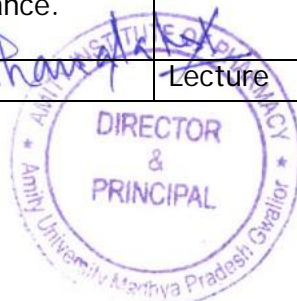
Q: Quiz, A: Assignment, OB: Open book test, FW: Field work, GD: Group discussion, S: Seminar, STI: Student – Teacher interaction

### F. Suggested Text/Reference Books:

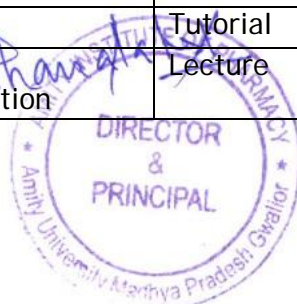
1. W.B. Hugo and A.D. Russel: Pharmaceutical Microbiology, Blackwell Scientific publications, Oxford London.
2. Prescott and Dunn., Industrial Microbiology, 4th edition, CBS Publishers & Distributors, Delhi.
3. Pelczar, Chan Kreig, Microbiology, Tata McGraw Hill edn.
4. Malcolm Harris, Balliere Tindall and Cox: Pharmaceutical Microbiology.
5. Rose: Industrial Microbiology.
6. Probisher, Hinsdill et al: Fundamentals of Microbiology, 9th ed. Japan
7. Cooper and Gunn's: Tutorial Pharmacy, CBS Publisher and Distribution.
8. Pepler: Microbial Technology.
9. I.P., B.P., U.S.P.- latest editions.
10. Ananthnarayan : Text Book of Microbiology, Orient-Longman, Chennai
11. Edward: Fundamentals of Microbiology.
12. N.K.Jain: Pharmaceutical Microbiology, Vallabh Prakashan, Delhi
13. Bergeys manual of systematic bacteriology, Williams and Wilkins- A Waverly company

### G. Lecture Plan

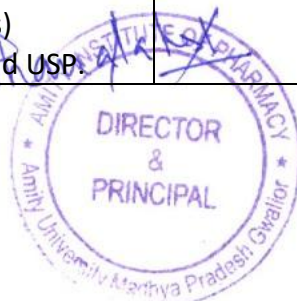
Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1.	Introduction, history of microbiology, its branches, scope and its importance.	Lecture	1	Mid Term-1, Quiz & End Sem Exam
2.	Branches of microbiology, scope and its importance.	Lecture	1	Mid Term-1, Quiz & End Sem Exam
3.	Introduction to	Lecture	1	Mid Term-1,



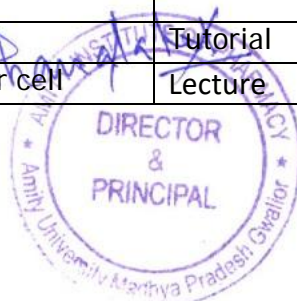
	Prokaryotes Eukaryotes			Quiz & End Sem Exam
4.	Tutorial	Tutorial		
5.	<b>Study of ultra-structure of bacteria</b>	Lecture	1	Mid Term-1, Quiz & End Sem Exam
6.	Study of morphological classification of bacteria	Lecture	1	Mid Term-1, Quiz & End Sem Exam
7.	Study of nutritional requirements of bacteria, raw materials used for culture media	Lecture	1	Mid Term-1, Quiz & End Sem Exam
8.	Tutorial	Tutorial		
9.	Study of physical parameters for of bacterial growth	Lecture	1	Mid Term-1, Quiz & End Sem Exam
10.	Revision	Lecture	1	Mid Term-1, Quiz & End Sem Exam
11.	Study of growth curve and isolation and preservation methods for pure culture	Lecture	1	Mid Term-1, Quiz & End Sem Exam
12.	Tutorial	Tutorial	1	
13.	Study of quantitative measurement of bacterial growth (total & viable count).	Lecture	1	Mid Term-1, Quiz & End Sem Exam
14.	Study of different types of phase contrast microscopy, dark field microscopy and electron microscopy.	Lecture	1	Mid Term-1, Quiz & End Sem Exam
15.	Unit test	Lecture	1	Mid Term-1, Quiz & End Sem Exam
16.	Tutorial	Tutorial		
17.	Identification of bacteria using staining techniques (simple staining, Gram's staining, Acid fast staining)	Lecture	2	Mid Term-1, Quiz & End Sem Exam
18.	Identification of bacteria using biochemical tests (IMViC).	Lecture	2	Mid Term-1, Quiz & End Sem Exam
19.	Study of principle, procedure, merits, demerits and applications of Physical, chemical and mechanical method of sterilization.	Lecture	2	Mid Term-1, Quiz & End Sem Exam
20.	Tutorial	Tutorial		
21.	Evaluation of the efficiency of sterilization	Lecture	2	Mid Term-1, Quiz & End



	methods.			Sem Exam
22.	Equipments employed in large scale sterilization, Sterility indicators	Lecture	2	Mid Term-1, Quiz & End Sem Exam
23.	Quiz			Mid Term-1, Quiz & End Sem Exam
24.	Tutorial	Tutorial		
25.	Study of morphology and classification of Fungi.	Lecture	3	Mid Term-2, Quiz & End Sem Exam
26.	Study of reproduction/replication of Fungi	Lecture	3	Mid Term-2, Quiz & End Sem Exam
27.	Study of cultivation of Fungi	Lecture	3	Mid Term-2, Quiz & End Sem Exam
28.	Tutorial	Tutorial		
29.	Study of morphology of Virus.	Lecture	3	Mid Term-2, Quiz & End Sem Exam
30.	Study of classification and cultivation of Virus.	Lecture	3	Mid Term-2, Quiz & End Sem Exam
31.	Study of reproduction/replication of Virus.	Lecture	3	Mid Term-2, Quiz & End Sem Exam
32.	Classification of action of disinfectants method of sterilization.	Lecture	3	Mid Term-2, Quiz & End Sem Exam
33.	Classification and mode of action of disinfectants method of sterilization.	Lecture	3	Mid Term-1, Quiz & End Sem Exam
34.	Tutorial	Tutorial		
35.	Factors influencing disinfection, antiseptics and their evaluation.	Lecture	3	Mid Term-1, Quiz & End Sem Exam
36.	applications of Physical, chemical and mechanical method of sterilization	Lecture	3	Mid Term-2, Quiz & End Sem Exam
37.	Evaluation of bactericidal & Bacteriostatic.	Lecture	3	Mid Term-2, Quiz & End Sem Exam
38.	Tutorial 09	Tutorial		
39.	Sterility testing of products (solids, liquids, ophthalmic and other sterile products) according to IP, BP and USP.	Lecture	3	Mid Term-2, Quiz & End Sem Exam



40.	Designing of aseptic area, laminar flow and different sources of contamination..	Lecture	4	Mid Term-2, Quiz & End Sem Exam
41.	Unit test	Lecture	4	Mid Term-2, Quiz & End Sem Exam
42.	Tutorial	Tutorial		
43.	methods of prevention, clean area classification.	Lecture	4	Mid Term-2, Quiz & End Sem Exam
44.	Principles and methods of different microbiological assay.	Lecture	4	Mid Term-2, Quiz & End Sem Exam
45.	Tutorial	Tutorial		
46.	Methods for standardization of antibiotics, vitamins and amino acids.	Lecture	4	Quiz & End Sem Exam
47.	Assessment of a new antibiotic.	Lecture	4	Quiz & End Sem Exam
48.	testing of antimicrobial activity of a new substance.	Lecture	4	Quiz & End Sem Exam
49.	Tutorial	Tutorial		
50.	General aspects- environmental cleanliness. Types of spoilage	Lecture	5	Quiz & End Sem Exam
51.	factors affecting the microbial spoilage of pharmaceutical products, sources and types of microbial contaminants, assessment of microbial contamination and spoilage.	Lecture	5	Quiz & End Sem Exam
52.	Sources and types of microbial contaminants	Lecture	5	Quiz & End Sem Exam
53.	Tutorial	Tutorial		
54.	assessment of microbial contamination and spoilage.	Lecture	5	Quiz & End Sem Exam
55.	Revision of microbial contamination	Lecture	5	Quiz & End Sem Exam
56.	Preservation of pharmaceutical products using antimicrobial agents, evaluation of microbial stability of formulations.	Lecture	5	Quiz & End Sem Exam
57.	Tutorial	Tutorial		
58.	Growth of animal cells in culture	Lecture	5	Mid Term-2, Quiz & End Sem Exam
59.	Tutorial	Tutorial		
60.	general procedure for cell	Lecture	5	Mid Term-2,



	culture, Primary, established and transformed cell cultures			Quiz & End Sem Exam
61.	Application of cell cultures in pharmaceutical industry and research.	Lecture	5	Mid Term-2, Quiz & End Sem Exam
62.	Tutorial	Tutorial		

#### H. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES										
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11
BP303T.1	Discuss various methods used for evaluation of disinfectants.	2	2	3	2	-	1	2	1	-	-	1
BP303T.2	<i>Discuss phenol coefficient test.</i>	2	2	2	3	-	1	1	1	-	-	1
BP303T.3	<i>What is sterilization? Explain in detail the various physical methods of sterilization.</i>	2	1	1	-	-	1	3	2	-	-	-
BP303T.4	<i>Discuss the various applications of cell cultures in pharmaceutical industries</i>	2	2	2	1	-	1	-	-	-	-	-
BP303T.5	<i>Write a note on chemical indicators of sterilization.</i>	2	1	-	-	-	2	1	1	-	-	1



### Sample Question Paper

Amity School of Pharmacy Department of Pharmacology I MID-SEMESTER(SEM-III)2023-24						
Class: B.Pharm.- III Semester						
Subject Name: BP303T PHARMACEUTICAL MICROBIOLOGY (Theory)		Time:1 Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		
CO Map	Question No.	Question				Marks
CO1	Q.1	Define 'microbiology' and 'Pharmaceutical microbiology'.				2
CO2	Q.2	Differentiate between 'Tyndallization' and 'Inspissation' technique.				2
	Q.3	Illustrate the classification of Fungai.				2
CO2	Q.4	Give the principle of simple staining.				2
CO2	Q.5	Enlist the various nutritional components of culture media.				2
CO4	Q.6	Explain the IMViC biochemical tests and their role in bacterial identification.				10
CO1	Q.7	Discuss the ultra-structure of bacteria by illustrating a detailed diagram.				10
CO2,5	Q.8	Discuss the principle, applications, merits, and working of the autoclaving technique.				5
	Q.9	Write a detailed note on microbial limit test.				5
CO5	Q.10	Write a note on chemical preservatives.				5



Attainments		Rubric
Level	1	If 60% of students secure more than 60% marks then level 1
Level	2	If 70% of students secure more than 60% marks then level 2
Level	3	If 80% of students secure more than 60% marks then level 3

*H. H. H. H.*



DIRECTOR  
&  
PRINCIPAL



# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR
AMITY INSTITUTE OF PHARMACY
DEPARTMENT OF PHARMACEUTICS

## PROGRAMME OUTCOMES AND PROGRAMME-SPECIFIC OUTCOMES

Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

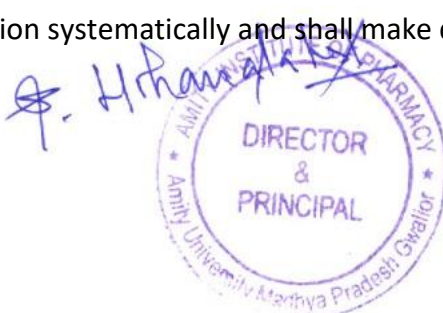
**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### **Program Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills, and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific inquiry, thinking analytically, clearly, and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.



**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership, and team-building when planning changes required for the fulfillment of practice, and professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication, and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.



**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “-”

PROGRAMME ARTICULATION MATRIX																	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
III SEM																	
	BP304T	3	2	3	1	-	-	1	-	-	3	2					
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*A. H. H. H.*  




# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

<b>DEPARTMENT OF PHARMACEUTICS</b>
<b>Course Handout</b>
Course : PHARMACEUTICAL ENGINEERING THEORY
Course Code : BP304T, Crédits : 04, Session :2023-24 (Odd Sem.), Class : B.Pharm. 2nd Year
Faculty Name: Dr. Rajeev Sharma & Dr. Tanweer Haider

**A. Introduction:** The objective of this course is to understand the various unit operations used in pharmaceutical industries, material handling techniques. various processes involved in the pharmaceutical manufacturing process; the significance of plant layout design for optimum use of resources and various preventive methods used for corrosion control in pharmaceutical industries.

**B. Course Outcomes:** At the end of the course, students will be able to:

**BP304T.1.** Define various unit operations used in pharmaceutical industries.

**BP304T.2.** Relate the material handling techniques according to the available materials.

**BP304T.3.** Explain various processes & equipment involved in the pharmaceutical manufacturing process.

**BP304T.4.** Analyse various conditions & precautions to prevent environmental pollution.

**BP304T.5.** Analyse & Plan plant layout design for optimum use of resources .

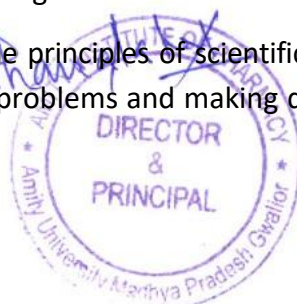
**BP304T.6** Utilize various preventive methods used for corrosion control in pharmaceutical industries.

**C. Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

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#### D. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	3%
	Student – Teacher interaction	S-T I	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

#### E. Syllabus

##### UNIT – I

**Flow of fluids:** Types of manometers, Reynolds number and its significance, Bernoulli's theorem and its applications, Energy losses, Orifice meter, Venturimeter, Pitot tube and Rotometer.

**Size Reduction:** Objectives, Mechanisms & Laws governing size reduction, factors affecting size reduction, principles, construction, working, uses, merits and demerits of Hammer mill, ball mill, fluid energy mill, Edge runner mill & end runner mill.

**Size Separation:** Objectives, applications & mechanism of size separation, official standards of powders, sieves, size separation Principles, construction, working, uses, merits and demerits of Sieve shaker, cyclone separator, Air separator, Bag filter & elutriation tank.

##### UNIT – II

**Heat Transfer:** Objectives, applications & Heat transfer mechanisms. Fourier's law, Heat transfer by conduction, convection & radiation. Heat interchangers & heat exchangers.

**Evaporation:** Objectives, applications and factors influencing evaporation, differences between evaporation and other heat process. principles, construction, working, uses, merits and demerits of Steam jacketed kettle, horizontal tube evaporator, climbing film evaporator, forced circulation evaporator, multiple effect evaporator & Economy of multiple effect evaporator.

**Distillation:** Basic Principles and methodology of simple distillation, flash distillation, fractional distillation, distillation under reduced pressure, steam distillation & molecular distillation



### UNIT – III

**Drying:** Objectives, applications & mechanism of drying process, measurements & applications of Equilibrium Moisture content, rate of drying curve. principles, construction, working, uses, merits and demerits of Tray dryer, drum dryer spray dryer, fluidized bed dryer, vacuum dryer, freeze dryer.

**Mixing:** Objectives, applications & factors affecting mixing, Difference between solid and liquid mixing, mechanism of solid mixing, liquids mixing and semisolids mixing. Principles, Construction, Working, uses, Merits and Demerits of Double cone blender, twin shell blender, ribbon blender, Sigma blade mixer, planetary mixers, Propellers, Turbines, Paddles & Silverson Emulsifier,

### UNIT – IV

**Filtration:** Objectives, applications, Theories & Factors influencing filtration, filter aids, filter medias. Principle, Construction, Working, Uses, Merits and demerits of plate & frame filter, filter leaf, rotary drum filter, Meta filter & Cartridge filter, membrane filters and Seidtz filter.

**Centrifugation:** Objectives, principle & applications of Centrifugation, principles, construction, working, uses, merits and demerits of Perforated basket centrifuge, Non-perforated basket centrifuge, semi continuous centrifuge & super centrifuge.

### UNIV – V

Materials of pharmaceutical plant construction, Corrosion and its prevention: Factors affecting during materials selected for Pharmaceutical plant construction, Theories of corrosion, types of corrosion and there prevention. Ferrous and nonferrous metals, inorganic and organic non metals, basic of material handling systems.

#### F. Examination Scheme:

Components	A	CT	S/V/Q/HA	STI	EE
Weightage (%)	4	15	3	3	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination; A: Attendance

#### G. Suggested Text/Reference Books:

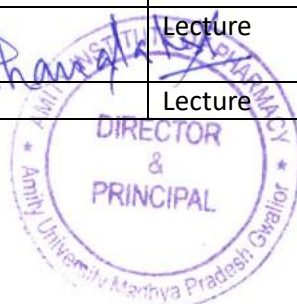
1. Introduction to chemical engineering – Walter L Badger & Julius Banchero, Latest edition.
2. Solid phase extraction, Principles, techniques and applications by Nigel J.K. Simpson- Latest edition.
3. Unit operation of chemical engineering – McCabe Smith, Latest edition.
4. Pharmaceutical engineering principles and practices – C.V.S Subrahmanyam et al., Latest edition.
5. Remington practice of pharmacy- Martin, Latest edition.
6. Theory and practice of industrial pharmacy by Lachmann., Latest edition.
7. Physical pharmaceutics- C.V.S Subrahmanyam et al., Latest edition. 8. Cooper and Gunn's Tutorial pharmacy, S.J. Carter, Latest edition.



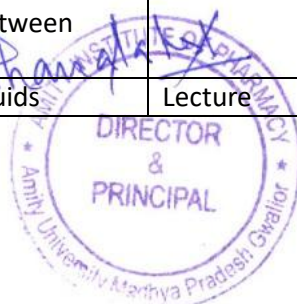


## H. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction to flow of fluid and simple manometer	Lecture	2	Mid Term-1, Quiz & End Sem Exam
2	Differential and inclined manometer, Energy losses	Lecture	2,5	Mid Term-1, Quiz & End Sem Exam
3	Reynolds number and its significance	Lecture	3	Mid Term-1, Quiz & End Sem Exam
4	Doubt clearing session	Tutorial	2,3,5	Mid Term-1, Quiz & End Sem Exam
5	Bernoulli's theorem and its applications	Lecture	2	Mid Term-1, Quiz & End Sem Exam
6	Orifice meter, Venturimeter	Lecture	2	Mid Term-1, Quiz & End Sem Exam
7	Pitot tube, Rotameter	Lecture	2	Mid Term-1, Quiz & End Sem Exam
8	Revision of fluid flow	Tutorial	2.3.5	Mid Term-1, Quiz & End Sem Exam
9	Objectives, Mechanisms & Laws governing size reduction, factors affecting size reduction	Lecture	1	Mid Term-1, Quiz & End Sem Exam
10	Hammer mill, ball mill	Lecture	2, 3	Mid Term-1, Quiz & End Sem Exam
11	fluid energy mill, Edge runner mill & end runner mill	Lecture	2, 3. 5	Mid Term-1, Quiz & End Sem Exam
12	Class test	Tutorial	2,3,5	Mid Term-1, Quiz & End Sem Exam
13	Objectives, applications & mechanism of size separation, official standards of powders	Lecture	1, 2	Mid Term-1, Quiz & End Sem Exam
14	official standards of sieves, size separation Principles, construction, working, uses, merits and demerits of cyclone separator, Sieve shaker	Lecture	2,3,4	Mid Term-1, Quiz & End Sem Exam
15	Air separator, Bag filter & elutriation tank	Lecture	2,3,4	Mid Term-1, Quiz & End Sem Exam
16	Corelative discussion of size reduction & size separation	Tutorial	1,2,3,4,5	Mid Term-1, Quiz & End Sem Exam
17	Objectives, applications & Heat transfer mechanisms	Lecture	1,	Mid Term-1, Quiz & End Sem Exam
18	Heat transfer by conduction	Lecture	1	Mid Term-1, Quiz & End Sem Exam
19	Heat transfer by convection & radiation	Lecture	1	Mid Term-1, Quiz & End Sem Exam
20	Group discussion on different topics	Tutorial	1,2,3,4,5	Mid Term-1, Quiz & End Sem Exam
21	Heat interchangers	Lecture	2,3,4	Mid Term-1, Quiz & End Sem Exam
22	heat exchangers	Lecture	2,3,4	Mid Term-1, Quiz



				& End Sem Exam
23	Objectives, applications and factors influencing evaporation, differences between evaporation and other heat process, Steam jacketed kettle,	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
24	Revision of heat chapter	Tutorial	1,2,3,4	Mid Term-1, Quiz & End Sem Exam
25	principles, construction, working, uses, merits and demerits of horizontal tube evaporator, climbing film evaporator	Lecture	2,3,4	Mid Term-1, Quiz & End Sem Exam
26	forced circulation evaporator, multiple effect evaporator & Economy of multiple effect evaporator	Lecture	2,3,4	Mid Term-1, Quiz & End Sem Exam
27	Basic Principles and methodology of simple distillation, steam distillation	Lecture	2,3,4	Mid Term-1, Quiz & End Sem Exam
28	Model making	Tutorial	3	Mid Term-1, Quiz & End Sem Exam
29	flash distillation,	Lecture	2,3,4	Mid Term-1, Quiz & End Sem Exam
30	molecular distillation	Lecture	2,3,4	Mid Term-1, Quiz & End Sem Exam
31	distillation under reduced pressure	Lecture	2,3,4	Mid Term-2, Quiz & End Sem Exam
32	Group discussion on distillation	Tutorial	1,2,3,4,5	Mid Term-2, Quiz & End Sem Exam
33	fractional distillation	Lecture	2,3,4	Mid Term-2, Quiz & End Sem Exam
34	Drying: Objectives, applications & mechanism of drying process, measurements & applications of Equilibrium Moisture content	Lecture	2,3,4	Mid Term-2, Quiz & End Sem Exam
35	rate of drying curve, principles, construction, working, uses, merits and demerits of Tray dryer	Lecture	2,3,4	Mid Term-2, Quiz & End Sem Exam
36	Class test	Tutorial	1,2,3,4,5	Mid Term-2, Quiz & End Sem Exam
37	drum dryer, spray dryer	Lecture	2,3,4	Mid Term-2, Quiz & End Sem Exam
38	fluidized bed dryer, vacuum dryer	Lecture	2,3,4	Mid Term-2, Quiz & End Sem Exam
39	freeze dryer,	Lecture	2,3,4	Mid Term-2, Quiz & End Sem Exam
40	Quiz	Tutorial	1,2,3,4,5	Mid Term-2, Quiz & End Sem Exam
41	Objectives, applications & factors affecting mixing, Difference between solid and liquid mixing	Lecture	1,2	Mid Term-2, Quiz & End Sem Exam
42	mechanism of solid mixing, liquids	Lecture	2,3,4	Mid Term-2, Quiz



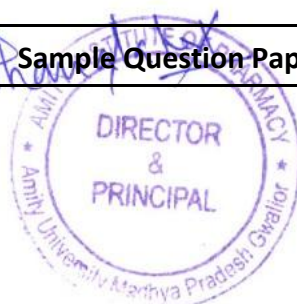
	mixing and semisolids mixing			& End Sem Exam
43	Principles, Construction, Working, uses, Merits and Demerits of Double cone blender, twin shell blender	Lecture	2,3,4	Mid Term-2, Quiz & End Sem Exam
44	Seminar	Tutorial	1,2,3,4,5	Mid Term-2, Quiz & End Sem Exam
45	ribbon blender, Sigma blade mixer, planetary mixers	Lecture	2,3,4	Mid Term-2, Quiz & End Sem Exam
46	Propellers, Turbines, Paddles & Silverson Emulsifier	Lecture	2,3,4	Mid Term-2, Quiz & End Sem Exam
47	Objectives, applications, Theories & Factors influencing filtration, filter aids	Lecture	1,2	Quiz & End Sem Exam
48	Discussion	Tutorial	1,2,3,4,5	Quiz & End Sem Exam
49	filter medias, rotary drum filter	Lecture	2,3,4	Quiz & End Sem Exam
50	Principle, Construction, Working, Uses, Merits and demerits of plate & frame filter	Lecture	2,3,4	Quiz & End Sem Exam
51	filter leaf, Meta filter & Cartridge filter, membrane filters and Seidtz filter	Lecture	2,3,4	Quiz & End Sem Exam
52	Model making	Tutorial	3	Quiz & End Sem Exam
53	Objectives, principle & applications of Centrifugation,	Lecture	1,2	Quiz & End Sem Exam
54	principles, construction, working, uses, merits and demerits of Perforated basket centrifuge, Non -perforated basket centrifuge	Lecture	2,3,4	Quiz & End Sem Exam
55	semi continuous centrifuge & super centrifuge	Lecture	2,3,4	Quiz & End Sem Exam
56	Test	Tutorial	1,2,3,4,5	Quiz & End Sem Exam
57	types of corrosion and there prevention	Lecture	1,2,5, 6	Quiz & End Sem Exam
58	Ferrous and nonferrous metals, inorganic and organic non metals	Lecture	1,2,5, 6	Quiz & End Sem Exam
59	basic of material handling systems	Lecture	1,2,5, 6	Quiz & End Sem Exam
60	Unit test	Tutorial	1,2,3,4,5,6	Quiz & End Sem Exam



### I. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	PSO1	PSO2	PSO3
<b>BP304T.1</b>	<b>BP304T.1:</b> Define various unit operations used in pharmaceutical industries.	3	1	1	-	-	2	-	-	-	-	-	-			
<b>BP304T.2</b>	<b>BP304T.2.</b> Relate the material handling techniques according to the available materials.	3	3	3	2	-	2	-	-	-	1	2				
<b>BP304T.3</b>	<b>BP304T.3.</b> Explain various processes & equipment involved in the pharmaceutical manufacturing process.	3	1	1	2	-	2	-	-	-	2	1				
<b>BP304T.4</b>	<b>BP304T.4.</b> Analyze various conditions & precautions to prevent environmental pollution.	3	3	2	1	-	2	3	-	-	3	3				
<b>BP304T.5</b>	Analyze & plan plant layout design for optimum use of resources.	3	3	2	1	-	2	3	-	-	3	3				
<b>BP304T.6</b>	Utilize various preventive methods used for corrosion control in pharmaceutical industries.	3	3	3	1	-	2	-	-	-	3	1				

Sample Question Paper



Amity Institute of Pharmacy  
Department of Pharmaceutics  
I MID-SEMESTER (SEM –IIIrd) 2023-24

Class: B.Pharm, III Semester

Subject Name: BP304T Pharmaceutical Engineering Theory		Time: 1 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,2,4	Q.3,5	Q.7,9	Q. 8,		
Students will be able to CO1: List the broad perceptive of cloud architecture and model. CO2: Apply different cloud programming models as per need.						
CO Map	Question No.	Question				Marks
CO2	Q.1	Define the term turbulent and shear mixing.				2
CO3	Q.2	Define the filter media & filtrate.				2
CO3	Q.3	Define the centrifuge and supernatant.				2
CO3	Q.4	Give examples of ferrous and non-ferrous materials used in pharmaceutical plant construction.				2
CO2	Q.5	What is electrochemical corrosion?				2
	Q.6	Derive the basic equation for the flow of fluid through the pipe and discuss its applications.				10
CO3	Q.7	Discuss in details construction with labeled diagram, working and advantages and disadvantages of Plate & frame filter press.				10
CO2	Q.8	Discuss in details construction with labeled diagram, working and advantages and disadvantages of Twin Shell blender.				5
CO4	Q.9	Describe the mathematical equation of Centrifugal effect or Relative centrifugal force (RCF).				5
CO3	Q.10	Differentiate between the liquid mixing and solid mixing.				5

  
 Director & Principal  
 Amity Institute of Pharmacy  
 Amity University, Madhya Pradesh, Gwalior

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**No Attainment Level:**

47.8 % Percentage of students secured more than 60% marks, so this course Pharmaceutical Engineering (Theory) (BP304T) not attained any Level.





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Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICS

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

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**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### Programme Outcomes:

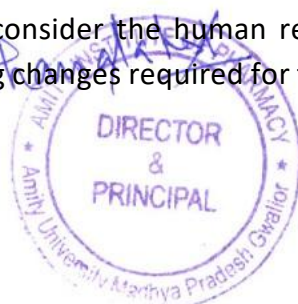
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**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “-”





**PROGRAMME ARTICULATION  
MATRIX**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3		
I SEM																		
	BP305P	3	-	2	-	1	3	2	1	1	-	2						


  
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<b>DEPARTMENT OF PHARMACEUTICS</b>
<b>Course Handout</b>
Course: PHARMACEUTICAL ORGANIC CHEMISTRY -II (Practical)
Course Code: BP305P, Credits:02, Session:2024-2025, Program: B. Pharm 2nd yr (3rd Sem)
Faculty Name: Dr. Tanweer Haider

1. **Introduction:** This course aims to enhance the knowledge on experiments involving laboratory techniques, Determination of oil values, and Preparation of compounds. Additionally, set of experiments, techniques such as recrystallization and steam distillation are used. The experiments involves determining the acid value, saponification value, and iodine value of oils. It also focuses on preparing various compounds through reactions like acylation, halogenation, nitration, oxidation, hydrolysis, diazotization and coupling, condensation, and Perkin reactions.

2. **Course Outcomes:** At the end of the course, students will be able to:

- BP305P.1.** gain hands-on experience in various organic synthesis methods, such as acylation, halogenation, nitration, and oxidation, allowing them to synthesize a range of organic compounds, including benzanilide, para bromo acetanilide, and benzoic acid.
- BP305P.2.** Develop skills in determining key oil values, including acid, saponification, and iodine values, which are critical for quality control in industries such as pharmaceuticals, cosmetics, and food.
- BP305P.3.** Through conducting specific reactions such as Claisen-Schmidt and Perkin reactions, students will gain a deeper understanding of the underlying mechanisms in organic transformations and multi-step synthesis.
- BP305P.4.** Perform recrystallization, steam distillation, and reagent standardization, students will refine their practical laboratory skills and techniques for purifying and analyzing organic compounds.
- BP305P.5.** Accurately standardize reagents and apply them in experiments, ensuring precise and reliable experimental outcomes in both academic and industrial settings.

### 3. Syllabus

I Experiments involving laboratory techniques

- Recrystallization
- Steam distillation

II Determination of following oil values (including standardization of reagents)

- Acid value
- Saponification value
- Iodine value

III Preparation of compounds

- Benzanilide/Phenyl benzoate/Acetanilide from Aniline/ Phenol



/Aniline by acylation reaction.

- 2,4,6-Tribromo aniline/Para bromo acetanilide from Aniline/
- Acetanilide by halogenation (Bromination) reaction.
- 5-Nitro salicylic acid/Meta di nitro benzene from Salicylic acid / Nitro benzene by nitration reaction.
- Benzoic acid from Benzyl chloride by oxidation reaction.
- Benzoic acid/ Salicylic acid from alkyl benzoate/ alkyl salicylate by hydrolysis reaction.
- 1-Phenyl azo-2-naphthol from Aniline by diazotization and coupling reactions.
- Benzil from Benzoin by oxidation reaction.
- Dibenzal acetone from Benzaldehyde by Claisen Schmidt reaction
- Cinnamic acid from Benzaldehyde by Perkin reaction
- *P*-Iodo benzoic acid from *P*-amino benzoic acid

#### 4. Assessment Plan

		Description	Code	Weightage %
Internal Assessment (15%)	Sessional Examination		SE	10%
	Continuous Mode (5%)	Practical Record	PR	1%
		Viva-voice	V	2%
		Attendance 95% – 100% = 2 90% – 94% = 1.5 85% – 89% = 1 80% – 84% = 0.5 Less than 80 = 0  A candidate is required to put in at least 80% attendance in individual courses considering theory and practical separately. The candidates securing less than 80% attendance are not eligible to appear for the respective examinations.	AT	2%
		End Semester Examination	ESE	35%
<b>Total</b>			<b>50%</b>	

**Abbreviations:** SE: Sessional Examination, PR: Practical Record, V: Viva-voice, AT: Attendance, ESE: End Semester Examination



- BP305P.1.** gain hands-on experience in various organic synthesis methods, such as acylation, halogenation, nitration, and oxidation, allowing them to synthesize a range of organic compounds, including benzanilide, para bromo acetanilide, and benzoic acid.
- BP305P.2.** Develop skills in determining key oil values, including acid, saponification, and iodine values, which are critical for quality control in industries such as pharmaceuticals, cosmetics, and food.
- BP305P.3.** Through conducting specific reactions such as Claisen-Schmidt and Perkin reactions, students will gain a deeper understanding of the underlying mechanisms in organic transformations and multi-step synthesis.
- BP305P.4.** Perform recrystallization, steam distillation, and reagent standardization, students will refine their practical laboratory skills and techniques for purifying and analyzing organic compounds.
- BP305P.5.** Accurately standardize reagents and apply them in experiments, ensuring precise and reliable experimental outcomes in both academic and industrial settings.

## 5. Lab Plan

Lab session	Topics	Corresponding CO	Mode of Assessing CO
1	To perform distillation of tap water to distilled water	4	
2	To determine the melting point of given organic compound	2,5	Sessional Exam/ Attendance/ Practical Record/Viva/ End-Sem Examination
3	To determine the acid value of given fat	2, 5	
4	To determine the saponification value of given fat	2, 5	
5	To determine the iodine value of given fat	2, 5	
6	To Prepare and characterize acetanilide from aniline by acetylation reaction	2, 5	
7	To Prepare and characterize Phenylbenzoate from aniline by acetylation reaction	1,3,4,5	
8	To Prepare and characterize acetanilide from aniline by acetylation reaction reaction	1,3,4,5	
9	To Prepare and characterize 2, 4, 6 Tribromoaniline from aniline	1,3,4,5	
10	To Prepare and characterize Para Bromo Acetanilide by halogenation (Bromination) reaction	1,3,4,5	
11	To Prepare and characterize benzoic acid from Benzyl chloride by oxidation reaction	1,3,4,5	
12	To Prepare and characterize benzoic acid from Benzyl chloride by oxidation reaction	1,3,4,5	
13	To Prepare and characterize Benzoic acid from ethyl benzoate by hydrolysis reaction	1,3,4,5	
14	To prepare and characterize Benzil from Benzoin by oxidation reaction	1,3,4,5	
15	To Prepare and characterize 1-Phenyl azo-2-naphthol from Aniline by diazotization and coupling reactions	1,3,4,5	



## 6. Course Articulation Matrix (Mapping of COs with POs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
<b>BP305P 1</b>	3	2	3	3	-	3	-	2	1	1	2	-	3	-
<b>BP305P 2</b>	3	2	3	3	-	2	-	2	1	-	3	-	3	-
<b>BP305P 3</b>	3	2	3	3	-	2	-	2	1	-	3	-	3	-
<b>BP305P 4</b>	3	2	3	3	-	2	-	2	1	-	3	-	3	-
<b>BP305P 5</b>	3	2	3	3	-	2	-	2	1	-	3	-	3	-

\*Note 1: Strongly related, 2: Moderately related, and 3: Weakly related

### Sample Question Paper

Amity Institute of Pharmacy Department of Pharmaceutics I MID-SEMESTER (SEM –3rd) 2023-24						
Class: B.Pharm, III Semester						
Subject Name: BP305P Pharmaceutical Organic chemistry II Practical		Time: 4 Hrs			Max. Marks: 40	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,3,4,5	Q.6,8,9	Q.2	Q.7, 10		
The student will be able to						

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- a. **BP305P.1.** gain hands-on experience in various organic synthesis methods, such as acylation, halogenation, nitration, and oxidation, allowing them to synthesize a range of organic compounds, including benzanilide, para bromo acetanilide, and benzoic acid.
- b. **BP305P.2.** Develop skills in determining key oil values, including acid, saponification, and iodine values, which are critical for quality control in industries such as pharmaceuticals, cosmetics, and food.
- c. **BP305P.3.** Through conducting specific reactions such as Claisen-Schmidt and Perkin reactions, students will gain a deeper understanding of the underlying mechanisms in organic transformations and multi-step synthesis.
- d. **BP305P.4.** Perform recrystallization, steam distillation, and reagent standardization, students will refine their practical laboratory skills and techniques for purifying and analyzing organic compounds.
- e. **BP305P.5.** Accurately standardize reagents and apply them in experiments, ensuring precise and reliable experimental outcomes in both academic and industrial settings.

CO Map	Question No.	Question	Marks
1,3	Q.1 a	Write the chemical reaction of synthesis of benzoic acid by benzyl chloride by oxidation reaction.	5
1,3,5	Q.1 b	Write the chemistry of oxidation of Benzoin.	5
1	Q.3	To prepare the 5-Nitro salicylic acid from Salicylic acid and calculate the percentage yield.	25
1,2,3,4, 5	Q.4	Quiz	5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**No Attainment Level:**

93.5 % Percentage of students secured more than 60% marks, so this course PHARMACEUTICAL ORGANIC CHEMISTRY -II (Practical) (BP305P) not attained any Level.



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**AMITY UNIVERSITY MADHYA PRADESH, GWALIOR**

**AMITY INSTITUTE OF PHARMACY**

**DEPARTMENT OF PHARMACEUTICS**

## **PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES**

### **PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)**

#### **Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24**

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

#### **Programme Outcomes:**

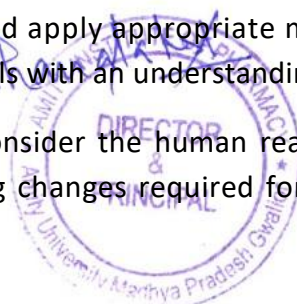
**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional





and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

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**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “-”



**PROGRAMME ARTICULATION  
MATRIX**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
IIISE M																
	BP306P	3	-	3	2	-	-	2	1	1	2	2	-	3	2	-

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# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

## DEPARTMENT OF PHARMACY

### Course Handout

Course : PHYSICAL PHARMACEUTICS I

Course Code : BP306 P, Programme : II.B. Pharmacy III-Semester  
Crédits : 04, Session : 2023-24 (Odd Sem.)

Faculty Name : Dr. M.Prathap

**A. Scope:** The course deals with the various physical and physicochemical properties, and principle involved in dosage forms/formulations. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.

**B. Course Outcome: At the end of each course, the student will be able to:**

C306.1	To understand the significance of physical properties such as solubility, surface tension, partition coefficient and pKa in the design of dosage forms.
C306.2	To explain adsorption isotherms and determine Freundlich- Langmuir constant using activated charcoal
C306.3	To apply Henderson – Hasselbalch equation for interpretation of pKa value of drugs
C306.4	To determine the surface tension of sample liquids by drop count and drop weight methods
C306.5	To deduce the HLB value and critical micellar concentration of a surfactant.
C306.6	To estimate the stability constants of complexes by solubility and pH titration methods

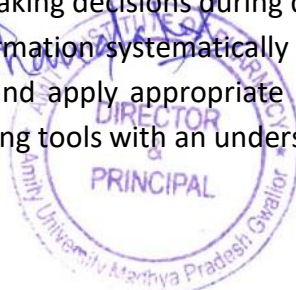
**C. 1. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**2. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**3. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice.

Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**4. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.



**5. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well-being.

**6. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**7. Pharmaceutical Ethics:** Honor personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**8. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**9. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional Pharmacy Practice

**10. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

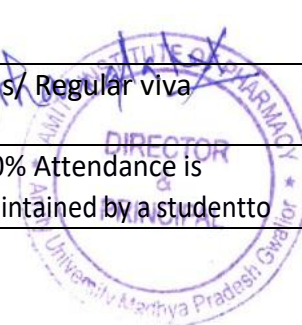
**11. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self- assess and use feedback effectively

**D. Programme specific outcomes:**

1. Scientific Thinking: Enable student's knowledge in scientific perception to understand the concepts and to solve the problems positively while making pharmaceutical formulations.
2. Analytical Skills: Assimilate and develop analytical skills using advanced equipment to design and evaluate pharmaceutical products, also to assess their quality.
3. Resource Management: Utilize and manage resources from natural, semi synthetic and synthetic origin to develop real time products with utmost benefit and safety.
4. Public Health Care: Promote and empower the healthy living in the community by various means of awareness and health strategies.
5. Entrepreneurship: Acquire and develop entrepreneurship and administration skills to establish community pharmacy, learning and training centers for the long term wellbeing of society.

**E. Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	LT	20%
	Mid Term 2		
	Practical Records/ Regular viva voce	PR/RVV	6%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to	A	4%



	be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.		
End Semester Examination	End Semester Examination	EE	70%
<b>Total</b>			<b>100%</b>

## F. Syllabus

1. Determination the solubility of drug at room temperature
2. Determination of pKa value by Half Neutralization/ Henderson Hasselbalch equation.
3. Determination of Partition co- efficient of benzoic acid in benzene and water
4. Determination of Partition co- efficient of Iodine in CCl<sub>4</sub> and water
5. Determination of % composition of NaCl in a solution using phenol-water system by CST method
6. Determination of surface tension of given liquids by drop count and drop weight method
7. Determination of HLB number of a surfactant by saponification method
8. Determination of Freundlich and Langmuir constants using activated char coal
9. Determination of critical micellar concentration of surfactants
10. Determination of stability constant and donor acceptor ratio of PABA-Caffeine complex by solubility method
11. Determination of stability constant and donor acceptor ratio of Cupric-Glycine complex by pH titration method

## G. Examination Scheme:

Components	A	LT	PR/RVV	EE
Weightage (%)	4	20	6	70

LT: Lab Test, PR/RVV: Practical Records/ Regular viva voce, EE: End Semester Examination; A: Attendance

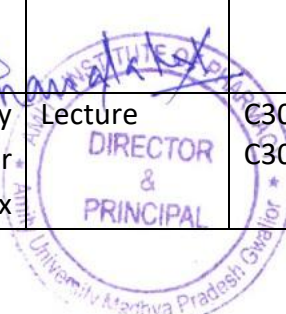
## H. Suggested Text/Reference Books:

1. Physical Pharmacy by Alfred Martin
2. Experimental Pharmaceutics by Eugene, Parott.
3. Tutorial Pharmacy by Cooper and Gunn.
4. Stocklosam J. Pharmaceutical Calculations, Lea &Febiger, Philadelphia.
5. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, MarcelDekkar Inc.
6. Liberman H.A, Lachman C, Pharmaceutical Dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc.
7. Physical Pharmaceutics by Ramasamy C and ManavalanR.
8. Laboratory Manual of Physical Pharmaceutics, C.V.S. Subramanian, J. Thimma settee
9. Physical Pharmaceutics by C.V.S. Subramanyam



## I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Determination the solubility of drug at room temperature	Lecture	C306.1	Mid Term-1, PR/RVV & End Sem Exam
2	Determination of pKa value by Half Neutralization/ Henderson Hasselbalch equation.	Lecture	C306.1& C306.3	Mid Term-1, PR/RVV & End Sem Exam
3	Determination of Partition co- efficient of benzoic acid in benzene and water	Lecture	C306.1	Mid Term-1, PR/RVV & End Sem Exam
4	Determination of Partition co- efficient of Iodine in CCl <sub>4</sub> and water	Lecture	C306.1	Mid Term-1, PR/RVV & End Sem Exam
5	Determination of % composition of NaCl in a solution using phenol-water system by CST method	Lecture	C306.1& C306.3	Mid Term-1, PR/RVV & End Sem Exam
6	Determination of surface tension of given liquids by drop count and drop weight method	Lecture	C306.4	Mid Term-1, PR/RVV & End Sem Exam
7	Determination of HLB number of a surfactant by saponification method	Lecture	C306.5	Mid Term-1, PR/RVV & End Sem Exam
8	Determination of Freundlich and Langmuir constants using activated char coal	Lecture	C306.2	Mid Term-1, PR/RVV & End Sem Exam
9	Determination of critical micellar concentration of surfactants	Lecture	C306.1& C306.3	Mid Term-2, PR/RVV & End Sem Exam
10	Determination of stability constant and donor acceptor ratio of PABA-Caffeine complex by solubility method.	Lecture	C306.1& C306.3	Mid Term-2, PR/RVV & End Sem Exam
11	Determination of stability constant and donor acceptor ratio of Cupric-Glycine complex	Lecture	C306.1& C306.3	Mid Term-2, PR/RVV & End Sem Exam



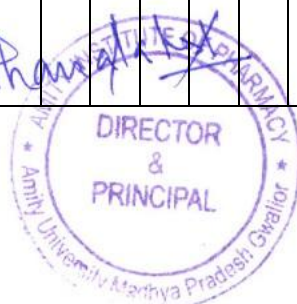
	by pH titration method.			Exam
12	Determination of surface tension of given liquids by drop count and drop weight method	Lecture	C306.4	Mid Term-2, PR/RVV & End Sem Exam
13	Effect of sodium chloride on critical solution temperature of phenol- water system	Lecture	C306.4	Mid Term-2, PR/RVV & End Sem Exam
14	Effect of ethanol on critical solution temperature of phenol-water system	Lecture	C306.4	Mid Term-2, PR/RVV & End Sem Exam
15	Determination of buffer capacity of a pharmaceutical buffer.	Lecture	C306.1& C306.3	Mid Term-2, PR/RVV & End Sem Exam
16	Effect of succinic acid on critical solution temperature of phenol-water system	Lecture	C306.1& C306.3	Mid Term-2, PR/RVV & End Sem Exam

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### I. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES											CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
<b>BP306P.1</b>	To understand the significance of physical properties such as solubility, surface tension, partition coefficient and pKa in the design of dosage forms.	3	1	2	2	3	2	1	-	-	1	-		3	2	-
<b>BP306P.2</b>	To explain adsorption isotherms and determine Freundlich-Langmuir constant using activated charcoal	1	-	3	1	-	-	1	-	2	1	1		3	2	-
<b>BP306P.3</b>	To apply Henderson – Hasselbalch equation for interpretation of pKa value of drugs	1	2	-	1	2	-	2	1	-	-	1		3	2	-
<b>BP306P.4</b>	To determine the surface tension of sample liquids by drop count and drop weight methods	2	1	1	1	-	1	2	-	1	-	2		3	2	-
<b>BP306P.5</b>	To deduce the HLB value and critical micellar concentration of a surfactant.	1	1	2	-	2	-	1	1	1	2	3		3	2	-

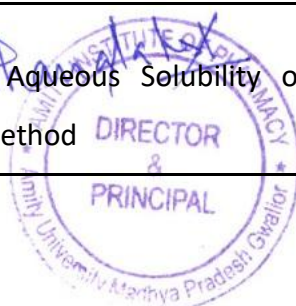




<b>BP306P.6</b>	To estimate the stability constants of complexes by solubility and pH titration methods	3	1	1	1	-	1	2	-	1	-	2		3	2	-
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### Sample Question Paper

Amity Institute of Pharmacy Department of Pharmaceutics I MID-SEMESTER (SEM –III) 2023-24						
Class: B.Pharm, III Semester						
Subject Name: BP306P Physical Pharmaceutics-I Practical		Time: 4 Hrs			Max. Marks: 40	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,2,4	Q.2,4		Q.3	Q.3	
Student will be able to						
<b>C306.1</b>	To understand the significance of physical properties such as solubility, surface tension, partition coefficient and pKa in the design of dosage forms.					
<b>C306.2</b>	To explain adsorption isotherms and determine Freundlich- Langmuir constant using activated charcoal					
<b>C306.3</b>	To apply Henderson – Hasselbalch equation for interpretation of pKa value of drugs					
<b>C306.4</b>	To determine the surface tension of sample liquids by drop count and drop weight methods					
<b>C306.5</b>	To deduce the HLB value and critical micellar concentration of a surfactant.					
<b>C306.6</b>	To estimate the stability constants of complexes by solubility and pH titration methods					
CO Map	Question No.	Question				Marks
CO1,2,4	Q.1	Synopsis- Write the principle involved in Micellar solubilization				5
CO1,2,4	Q.2	Synopsis Write the principle involved in determination of pKa of benzoic acid by half neutralization.				5
CO1,2, 4,5	Q.3	Experiment 1.Determine Aqueous Solubility of given sample by Volumetric Method				25



		or 2. Determine the surface tension of given sample liquids by drop number method.	
CO1,2,3,4,5	Q.4	Viva	5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

72.8 % Percentage of students secured more than 60% marks, so this course PHYSICAL PHARMACEUTICS –I PRACTICAL(BP306P) attained 2<sup>nd</sup> Level.

*H. H. H. H.*





AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACOLOGY

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

#### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### Programme Outcomes:

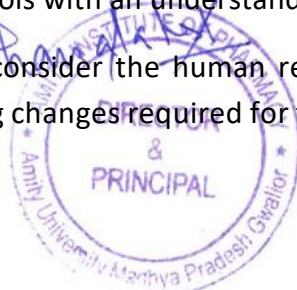
**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and



societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “-”



<b>PROGRAMME ARTICULATION MATRIX</b>																
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
III SEM																
	BP307P	3	3	3	3	2	3	2	2	2	1	2		-	1	-

*[Handwritten Signature]*  
**DIRECTOR & PRINCIPAL**  
 AMITY INSTITUTE OF PHARMACY  
 Amity University, Mathya Pradesh Gwalior



<b>DEPARTMENT OF PHARMACOLOGY</b>
<b>Course Handout</b>
Course: PHARMACEUTICAL MICROBIOLOGY (Practical)
Course Code : BP307P, Crédits : 02, Session :2023-24 (Odd Sem.), Class : B.Pharm. 2 <sup>nd</sup> Year
Faculty Name : Dr. Narender Kumar

- A. Introduction:** Pharmaceutical Microbiology (Practical) introduces students to essential microbiological techniques applied in the pharmaceutical industry, focusing on sterilization methods, microbial testing, and contamination control.
- B. Course Outcomes:** At the end of the course, students will be able to:
- BP307P.1.** Understand methods of identification, cultivation and preservation of various microorganisms
  - BP307P.2.** Understand the importance and implementation of sterilization in pharmaceutical processing and industry
  - BP307P.3.** Learn sterility testing of pharmaceutical products
  - BP307P.4.** Carried out microbiological standardization of Pharmaceuticals.
  - BP307P.5.** Understand the cell culture technology and its applications in pharmaceutical industries.
- C. Programme Outcomes:**
- [PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
- [PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
- [PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
- [PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
- [PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.
- [PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).



**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

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**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**D. Assessment Plan:**

<b>Component of Evaluation</b>	<b>Description</b>	<b>Code</b>	<b>Weightage %</b>
Continuous Internal Evaluation	Mid Term 1	CT	10%
	Mid Term 2		
	Lab record	LR	1%
	Viva	V	2%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	2%
End Semester Examination	End Semester Examination	EE	35%
<b>Total</b>			<b>50%</b>

**E. Syllabus**

1. Introduction and study of different equipments and processing, e.g., B.O.D. incubator, laminar flow, aseptic hood, autoclave, hot air sterilizer, deep freezer, refrigerator, microscopes used in experimental microbiology.
2. Sterilization of glassware, preparation and sterilization of media.
3. Sub culturing of bacteria and fungus. Nutrient stabs and slants preparations.
4. Staining methods- Simple, Grams staining and acid fast staining (Demonstration with practical).
5. Isolation of pure culture of micro-organisms by multiple streak plate technique and other techniques.
6. Microbiological assay of antibiotics by cup plate method and other methods



7. Motility determination by Hanging drop method.
8. Sterility testing of pharmaceuticals.
9. Bacteriological analysis of water
10. Biochemical test.

#### F. Examination Scheme:

Components	A	CT	LR	V	EE
Weightage (%)	2	10	1	2	35

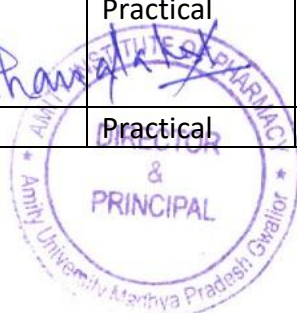
CT: Class Test, LR: Lab Record, V: Viva, EE: End Semester Examination; A: Attendance

#### G. Suggested Text/Reference Books:

- W.B. Hugo and A.D. Russel: Pharmaceutical Microbiology, Blackwell Scientific publications, Oxford London.
- Prescott and Dunn., Industrial Microbiology, 4th edition, CBS Publishers & Distributors, Delhi.
- MPelczar, Chan Kreig, Microbiology, Tata McGraw Hill edn.
- Indian pharmacopoeia.
- British pharmacopoeia.

#### H. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction and study of B.O.D. incubator	Practical	1, 5	Mid Term-1, Quiz & End Sem Exam
2	Introduction and study of laminar flow and aseptic hood	Practical	2, 3	Mid Term-1, Quiz & End Sem Exam
3	Introduction and study of autoclave, hot air sterilizer	Practical	2, 3	Mid Term-1, Quiz & End Sem Exam
4	Introduction and study of the deep freezer, refrigerator	Practical	1	Mid Term-1, Quiz & End Sem Exam
5	Introduction and study of various types of microscopes used in the microbiology lab.	Practical	4	Mid Term-1, Quiz & End Sem Exam
6	To study and perform Sterilization of glassware, preparation, and sterilization of media.	Practical	2, 3, 5	Mid Term-1, Quiz & End Sem Exam
7	To study Subculturing of bacteria and fungus.	Practical	1, 4, 5	Mid Term-1, Quiz & End Sem Exam
8	To prepare nutrient stabs and slants preparations for microbial culture.	Practical	1, 5	Mid Term-1, Quiz & End Sem Exam
9	To study Simple and Grams staining methods by bacterial sample.	Practical	4	Mid Term-1, Quiz & End Sem Exam
10	To study the Acid-fast staining method by bacterial sample.	Practical	4	Mid Term-1, Quiz & End Sem Exam
11	To perform Isolation of	Practical	4, 5	Mid Term-1, Quiz





	pure culture of micro-organisms by multiple streak plate and pour plate technique.			& End Sem Exam
12	To perform microbiological assay of antibiotics by cup plate method	Practical	1, 4, 5	Mid Term-1, Quiz & End Sem Exam
13	To determine bacterial Motility by Hanging drop method.	Practical	1, 4, 5	Mid Term-1, Quiz & End Sem Exam
14	To perform Sterility testing of pharmaceuticals.	Practical	2, 3	Mid Term-1, Quiz & End Sem Exam
15	To perform bacteriological analysis of water sample	Practical	4, 5	Mid Term-1, Quiz & End Sem Exam

### I. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
<b>BP307P.1.</b>	Understand methods of identification, cultivation and preservation of various microorganisms	3	3	2	3	-	1	3	2	1	2	2		2	2	2
<b>BP307P.2.</b>	Understand the importance and implementation of sterilization in pharmaceutical processing and industry	3	3	2	2	-	1	2	1	-	2	2		1	2	1
<b>BP307P.3.</b>	Learn sterility testing of pharmaceutical products	3	1	1	3	-	-	2	1	-	1	1		1	1	-
<b>BP307P.4.</b>	Carried out microbiological standardization of Pharmaceuticals.	3	3	2	3	1	-	2	1	-	2	1		3	3	2



<b>BP307P.5.</b>	Understand the cell culture technology and its applications in pharmaceutical industries.	3	3	2	3	1	-	2	2	1	1	1		2	3	1
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### Sample Question Paper

Amity Institute of Pharmacy Department of Pharmacology I MID-SEMESTER (SEM –3rd) 2023-24						
Class: B.Pharm, III Semester						
Subject Name: BP 307P.PHARMACEUTICAL MICROBIOLOGY (Practical)		Time: 4 Hrs			Max. Marks: 40	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1b,1e, 1c	Q.1a,1d	Q.2	Q.2,3		
The student will be able to <b>CO1.</b> Understand methods of identification, cultivation and preservation of various microorganisms <b>CO2.</b> Understand the importance and implementation of sterilization in pharmaceutical processing and industry <b>CO3.</b> Learn sterility testing of pharmaceutical products <b>CO4.</b> Carried out microbiological standardization of Pharmaceuticals. <b>CO.5.</b> Understand the cell culture technology and it applications in pharmaceutical industries.						
CO Map	Question No.	Question				Marks
CO1,2	Q.1a	Explain the function of a laminar flow hood in maintaining aseptic conditions.				2
CO1,3	Q.1b	What is the primary purpose of a B.O.D. incubator in microbiological experiments?				2
CO3	Q.1c	What is the role of an autoclave in the sterilization process?				2
CO3	Q.1d	Describe the difference between hot air sterilization and autoclaving.				2
CO3,4	Q.1e	List two reasons why sterilization of glassware is essential in microbiology experiments.				2
CO3,4,5	Q.2	Experiment To sterilize glassware and prepare and sterilize microbiological media for use in culturing microorganisms.				25
CO1,2,3,4,5	Q.3	Viva				5



Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**Attainment Level: 3**

92.4 % of students secured more than 60% marks, so this course PHARMACEUTICAL MICROBIOLOGY (Practical) (BP307P) attainment is level 3.

*A. H. H. H.*



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# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICS

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

**Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24**

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

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**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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**Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

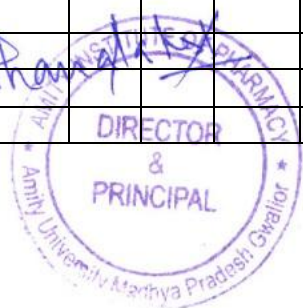
**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “-”

PROGRAMME ARTICULATION MATRIX																
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
III SEM	BP308P	3	-	3	2	-	3	-	--	1	3	1				





## DEPARTMENT OF Pharmaceutics

### Course Handout

Course : PHARMACEUTICAL ENGINEERING PRACTICAL

Course Code : BP308P, Crédits : 02, Session :2023-24 (Odd Sem.), Class : B.Pharm. 2nd Year

Faculty Name: Ankita Kishore, Dr. Wasim Akram, Dr. Rajeev Sharma

- A. Introduction:** The course is designed to impart skill development in the arts and science of preparing the different conventional dosage forms.
- B. Course Outcomes:** At the end of the course, students will be able to:
- BP308P.1.** To recall the principles used in the preparation of solid, liquid, and semi-solid dosage forms.
  - BP308P.2.** Operate equipment used in the manufacturing of different dosage forms
  - BP308P.3.** Formulate various conventional dosage forms such as solid dosage forms.
  - BP308P.4.** Design various liquid dosage forms and semi-solid dosage forms.
  - BP308P.5.** Estimate the ingredients calculation for preparation of dosage form
- C. Programme Outcomes:**
- [PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
- [PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
- [PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyse, evaluate and apply information systematically and shall make defensible decisions.
- [PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
- [PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfilment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.
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#### D. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	10%
	Mid Term 2		
	Lab record	LR	1%
	Viva	V	2%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves <i>including medical leaves.</i>	A	2%
End Semester Examination	End Semester Examination	EE	35%
<b>Total</b>			<b>50%</b>

#### E. Syllabus

- I. Determination of radiation constant of brass, iron, unpainted and painted glass.
- II. Steam distillation – To calculate the efficiency of steam distillation.
- III. To determine the overall heat transfer coefficient by heat exchanger.
- IV. Construction of drying curves (for calcium carbonate and starch).
- V. Determination of moisture content and loss on drying.
- VI. Determination of humidity of air – i) From wet and dry bulb temperatures –use of Dew point method.
- VII. Description of Construction working and application of Pharmaceutical Machinery such as





- rotary tablet machine, fluidized bed coater, fluid energy mill, de humidifier.
- VIII. Size analysis by sieving – To evaluate size distribution of tablet granulations – Construction of various size frequency curves including arithmetic and logarithmic probability plots.
  - IX. Size reduction: To verify the laws of size reduction using ball mill and determining Kicks, Rittinger's, Bond's coefficients, power requirement and critical speed of Ball Mill.
  - X. Demonstration of colloid mill, planetary mixer, fluidized bed dryer, freeze dryer and such other major equipment.
  - XI. Factors affecting Rate of Filtration and Evaporation (Surface area, Concentration and Thickness/ viscosity)
  - XII. To study the effect of time on the Rate of Crystallization.
  - XIII. To calculate the uniformity Index for given sample by using Double Cone Blender.

#### F. Examination Scheme:

Components	A	CT	LR	V	EE
Weightage (%)	2	10	1	2	35

CT: Class Test, LR: Lab Record, V: Viva, EE: End Semester Examination; A: Attendance

#### G. Suggested Text/Reference Books:

- Laboratory Manual of Pharmaceutical Engineering C.V.S Subrahmanyam et. al
- Practical Pharmaceutical Engineering, Gary Prager
- Practical Manual Of Pharmaceutical Engineering By Mrs. B. Jeevana Jyothi
- Cooper and Gunn's Tutorial pharmacy, S.J. Carter, Latest edition

#### H. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Demonstrate the pharmaceutical machinery available in the lab	Practical	1, 2	Mid Term-1, Quiz & End Sem Exam
2	Explain the construction, working and application of pharmaceutical equipment including fluidized bed coater, fluid energy mill, Silveson emulsifier	Practical	1,2	Mid Term-1, Quiz & End Sem Exam
3	Determine the effect of surface area on the rate of evaporation.	Practical	3	Mid Term-1, Quiz & End Sem Exam
4	Determine the effect of filter aid on the rate of filtration.	Practical	3, 5	Mid Term-1, Quiz & End Sem Exam



5	Determine the crystalline behavior of copper sulfate by shock cooling method.	Practical	3, 5	Mid Term-1, Quiz & End Sem Exam
6	Determine the effect of drying time on the moisture content of calcium carbonate slurry.	Practical	3,5	Mid Term-1, Quiz & End Sem Exam
7	Design the drying rate curve for given sample.	Practical	3, 5	Mid Term-1, Quiz & End Sem Exam
8	Determine the effect of surface area on the rate of drying.	Practical	3, 5	Mid Term-2, Quiz & End Sem Exam
9	Determine the humidity of the air by the dew point method	Practical	1, 3, 4, 5	Mid Term-2, Quiz & End Sem Exam
10	Demonstrate the working and construction of tablet punching machine.	Practical	1, 2, 3, 4	Mid Term-2, Quiz & End Sem Exam
11	Analyze the effect of number and size of ball on size reduction of given granular material by using a ball mill.	Practical	1, 2, 3, 4	Mid Term-2, Quiz & End Sem Exam
12	Determine the particle size distribution of a given sample by the sieving method.	Practical	1	Mid Term-2, Quiz & End Sem Exam
13	Determine the particle size distribution of a given sample by the microscopic method.	Practical	1, 3, 4	Mid Term-2, Quiz & End Sem Exam
14	Determine the effect of concentration on the rate of filtration	Practical	3, 5	Mid Term-2, Quiz & End Sem Exam
15	Evaluate the effect of centrifugation speed & time on the rate of sedimentation.	Practical	3, 5	Mid Term-2, Quiz & End Sem Exam

*S. H. H. H.*



## I. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	
<b>BP308P. 1</b>	Relate theoretical knowledge of equipment's practically, available in the lab	3	-	3	1	-	1	-	-	1	3	2	
<b>BP308P. 2.</b>	Understanding of construction, working, applications and principles of various instruments available in lab.	3	2	3	3	-	1	-	-	1	3	2	
<b>BP308P. 3.</b>	Study of various factors affecting different unit processes.	3	2	3	-	-	1	-	-	1	3	1	
<b>BP308P. 4.</b>	Checking of working efficiency of various instruments available in lab through proper practical approach	3	3	3	3	-	3	1	-	-	1	2	
<b>BP308P. 5.</b>	Verification of various theories applicable to different principles of instruments	3	1	2	1	-	1	-	-	-	3	-	



## Sample Question Paper

Amity Institute of Pharmacy Department of Pharmaceutics I MID-SEMESTER (SEM –Ist) 2023-24						
Class: B.Pharm, I Semester						
Subject Name: BP308P Pharmaceutical Engineering- Practical		Time: 4 Hrs			Max. Marks: 40	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,3	Q.4	Q.5	Q.2		
Student will be able to <b>CO.1.</b> Relate theoretical knowledge of equipment’s practically, available in the lab <b>CO.2.</b> Understanding of construction, working, applications and principles of various instruments available in lab. <b>CO.3.</b> Study of various factors affecting different unit processes. <b>CO.4.</b> Checking of working efficiency of various instruments available in lab through proper practical approach <b>CO.5.</b> Verification of various theories applicable to different principles of instruments						
CO Map	Question No.	Question				Marks
CO1	Q.1a	Synopsis- Discuss effect of factors affecting rate of filtration with respect to (a) surface area, (b) filter aid and (c) viscosity.				2
CO2	Q.1b	Synopsis- Give the principle of sieve shaker and ball mill.				2
CO1,2,3	Q.1c	Synopsis- Enlist the various parts of the plate and frame filter.				2
CO1,2,4	Q.1d	Synopsis- Discuss the construction and applications of steam distillation.				2
CO3,5	Q.1e	Synopsis- Enlist the various stages of drying rate curve.				2
CO1,2, 3,4,5	Q.2	Experiment To determine the effect of surface area of the rate of evaporation.				25
CO1,2,3,4,5	Q.3	Viva				5


Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**Attainment Level: 1**

79.3 % Percentage of students secured more than 60% marks, so this course Pharmaceutical Engineering – PRACTICAL (BP308P) attained Level 2.

*H. H. H. H.*



DIRECTOR  
&  
PRINCIPAL

*[Handwritten Signature]*





AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

#### **Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24**

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

#### **Programme Outcomes:**

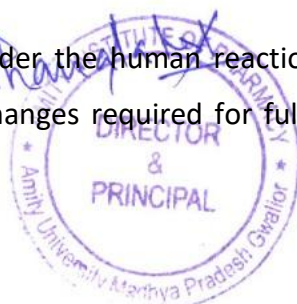
**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team -building when planning changes required for fulfillment of practice, professional



and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well-being.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

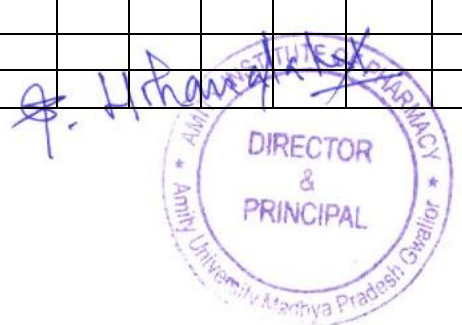
**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “-”

PROGRAMME ARTICULATION MATRIX																
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
IVSE M	BP402T	3	-	2	-	1	3	2	1	1	-	2				
	-															
	-															
	-															
	-															
	-															
	-															







## DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

### Course Handout

Course : PHARMACEUTICAL ORGANIC CHEMISTRY-III (Theory)

Course Code : BP401T, Crédits : 04, Session :2023-24(Even Sem.), Class : B.Pharm. 2<sup>nd</sup> Year

Faculty Name : Dr. Ram Babu Tripathi

**A. Introduction:** This subject imparts knowledge on stereo-chemical aspects of organic compounds and organic reactions, important named reactions, chemistry of important hetero cyclic compounds. It also emphasizes on medicinal and other uses of organic compounds.

**B. Course Outcomes:** At the end of the course

**BP401T.1.** Students will be able to **study** optical isomerism of compounds that could help the students to understand the chirality, sequence rules, racemic modification of organic compounds.

**BP401T.2.** Students will be able to **acquire** knowledge about geometrical isomerism of pharmaceutical organic compounds, with emphasis on their synthetic process, physical and chemical properties.

**BP401T.3.** Students will be able to **write** synthesis, reactions and medicinal uses different heterocyclic compounds.

**BP401T.4.** Students will be able to **analyze** various reactions for the synthesis of higher organic compounds.

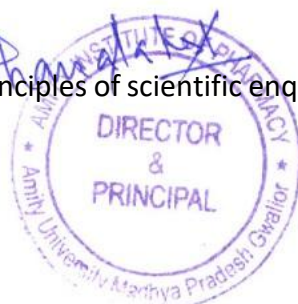
**BP401T.5.** Students will be able to **apply** reagents and various named reactions for the design of organic medicinal compounds.

**C. Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly



and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team -building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well-being.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

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**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self- assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.



**D. Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2 quiz, assignment, open book test, field work, group discussion and seminar)		
	Seminar/ Assignment/Quiz/ Open book test	S/As/Q/OBT	3%
Interaction	Student-Teacher interaction	ST	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

**E. Syllabus****Unit-1: Stereo isomerism**

Optical isomerism—Optical activity, enantiomerism, diastereoisomerism, meso compounds, Elements of symmetry, chiral and achiral molecules DL system of nomenclature of optical isomers, sequence rules, RS system of nomenclature of optical isomers, Reactions of chiral molecules, Racemic modification and resolution of racemic mixture. Asymmetric synthesis: partial and absolute

**Unit-2: Geometrical isomerism**

Nomenclature of geometrical isomers (Cis Trans, EZ, Syn Anti systems)

Methods of determination of configuration of geometrical isomers.

Conformational isomerism in Ethane, n-Butane and Cyclohexane.

Stereo isomerism in biphenyl compounds (Atropisomerism) and conditions for optical activity.

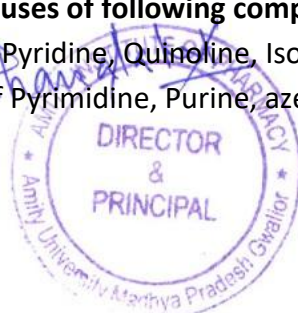
Stereospecific and stereoselective reactions

**Unit-3: Heterocyclic compounds:**

Nomenclature and classification, Synthesis, reactions and medicinal uses of following compounds/derivatives Pyrrole, Furan, and Thiophene - Relative aromaticity, reactivity and Basicity of pyrrole

**Unit-4: Synthesis, reactions and medicinal uses of following compounds/derivatives**

Pyrazole, Imidazole, Oxazole and Thiazole., Pyridine, Quinoline, Isoquinoline, Acridine and Indole. Basicity of pyridine, Synthesis and medicinal uses of Pyrimidine, Purine, azepines and their derivatives



### Unit-5: Reactions of synthetic importance

Metal hydride reduction (NaBH<sub>4</sub> and LiAlH<sub>4</sub>), Clemmensen reduction, Birch reduction, Wolff Kishner reduction. Oppenauer-oxidation and Dakin reaction. Beckmanns rearrangement and Schmidt rearrangement. Claisen-Schmidt condensation.

#### F. Examination Scheme:

Components	A	ST	CT	S/As/Q/OBT	EE
Weightage (%)	4	3	15	3	75

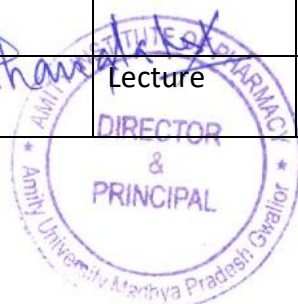
CT: Class Test, As: Assignment, ST: Student teacher interaction, S/A/Q/OBT: Seminar/ Assignment/Quiz/ Open book test, EE: End Semester Examination; A: Attendance

#### G. Suggested Text/Reference Books:

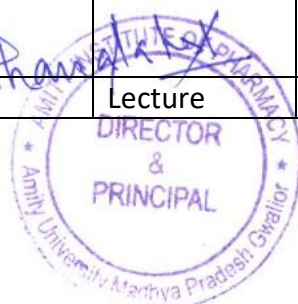
- o Organic chemistry by I.L. Finar, Volume-I & II.
- o A text book of organic chemistry – Arun Bahl, B.S. Bahl.
- o Heterocyclic Chemistry by Raj K. Bansal
- o Organic Chemistry by Morrison and Boyd

#### H. Lecture Plan

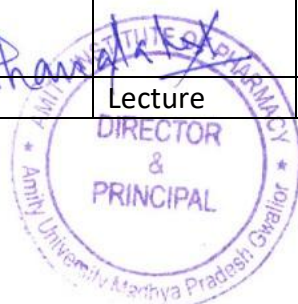
Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Optical activity	Lecture	BP401T.1	Mid Term-1, Quiz & End Sem Exam
2	Enantiomerism	Lecture	BP401T.1	Mid Term-1, Quiz & End Sem Exam
3	Meso compounds	Lecture	BP401T.1	Mid Term-1, Quiz & End Sem Exam
4	Tutorial class Optical activity	Lecture	BP401T.1	Mid Term-1, Assignment, Quiz & End Sem Exam
5	diastereoisomerism	Lecture	BP401T.1	Mid Term-1, Quiz & End Sem Exam
6	Elements of symmetry	Lecture	BP401T.1	Mid Term-1, Quiz & End Sem Exam
7	Chiral and achiral molecules,	Lecture	BP401T.1	Mid Term-1, Quiz & End Sem Exam
8	Tutorial class Elements of symmetry	Lecture	BP401T.1	Mid Term-1, Quiz, Class test & End Sem Exam
9	Resolution	Lecture	BP401T.1	Mid Term-1, Quiz & End



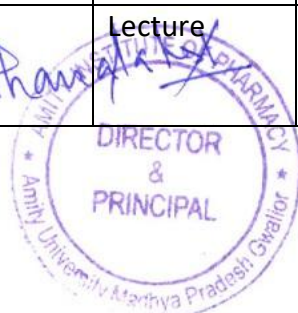
				Sem Exam
10	DL system of nomenclature of optical isomers	Lecture	BP401T.1	Mid Term-1, Quiz & End Sem Exam
11	Sequence rules	Lecture	BP401T.1	Mid Term-1, Quiz & End Sem Exam
12	<i>Tutorial class:</i> R and S	Lecture	BP401T.1	Mid Term-1, Assignment, Quiz & End Sem Exam
13	Racemic modification	Lecture	BP401T.1	Mid Term-1, Quiz & End Sem Exam
14	Reactions	Lecture	BP401T.1	Mid Term-1, Quiz & End Sem Exam
15	Asymmetric synthesis	Lecture	BP401T.1	Mid Term-1, Quiz & End Sem Exam
16	<i>Tutorial class</i> Asymmetric synthesis	Lecture	BP401T.1	Mid Term-1, Class test, Quiz & End Sem Exam
17	Geometrical isomerism	Lecture	BP401T.2	Mid Term-1, Quiz & End Sem Exam
18	Cis-Trans	Lecture	BP401T.2	Mid Term-1, Quiz & End Sem Exam
19	EZ	Lecture	BP401T.2	Mid Term-1, Quiz & End Sem Exam
20	<i>Tutorial class</i> Geometrical isomerism	Lecture	BP401T.2	Mid Term-1, Assignment, Quiz & End Sem Exam
21	Syn Anti systems	Lecture	BP401T.2	Mid Term-1, Quiz & End Sem Exam
22	Methods of determination of configuration of geometrical isomers	Lecture	BP401T.2	Mid Term-1, Quiz & End Sem Exam
23	Conformational isomerism	Lecture	BP401T.2	Mid Term-1, Quiz & End Sem Exam
24	<i>Tutorial class</i> Configuration of geometrical isomers	Lecture	BP401T.2	Mid Term-1, Quiz & End Sem Exam
25	Conditions for optical	Lecture	BP401T.2	Mid Term-1,



	activity.			Quiz & End Sem Exam
26	Stereospecific and stereoselective reactions	Lecture	BP401T.2	Mid Term-1, Quiz & End Sem Exam
27	Nomenclature of heterocyclic compounds	Lecture	BP401T.3	Mid Term-1, Quiz & End Sem Exam
28	<i>Tutorial class</i> Nomenclature	Lecture	BP401T.3	Mid Term-2, Seminar, Quiz & End Sem Exam
29	Classification of heterocyclic compounds	Lecture	BP401T.3	Mid Term-2, Quiz & End Sem Exam
30	Pyrrrole	Lecture	BP401T.3 & BP401T.4	Mid Term-2, Quiz & End Sem Exam
31	Furan	Lecture	BP401T.3 & BP401T.4	Mid Term-2, Quiz & End Sem Exam
32	<i>Tutorial class</i> Pyrrrole	Lecture	BP401T.3	Mid Term-2, Quiz & End Sem Exam
33	Thiophene.	Lecture	BP401T.3 & BP401T.4	Mid Term-2, Quiz & End Sem Exam
34	Relative aromaticity	Lecture	BP401T.3	Mid Term-2, Quiz & End Sem Exam
35	Reactivity	Lecture	BP401T.3	Mid Term-2, Quiz & End Sem Exam
36	<i>Tutorial class</i> Relative aromaticity	Lecture	BP401T.3	Mid Term-2, Assignment, Quiz & End Sem Exam
37	Basicity of pyrrole	Lecture	BP401T.3	Mid Term-2, Quiz & End Sem Exam
38	Pyrazole	Lecture	BP401T.3	Mid Term-2, Quiz & End Sem Exam
39	Imidazole	Lecture	BP401T.3	Mid Term-2, Quiz & End Sem Exam
40	<i>Tutorial class</i> Pyrazole	Lecture	BP401T.3	Mid Term-2, Quiz & End Sem Exam
41	Oxazole	Lecture	BP401T.3 &	Mid Term-2,



			BP401T.4	Quiz & End Sem Exam
42	Thiazole	Lecture	BP401T.3 & BP401T.4	Mid Term-2, Quiz & End Sem Exam
43	Pyridine	Lecture	BP401T.3 & BP401T.4	Mid Term-2, Quiz & End Sem Exam
44	<i>Tutorial class</i> Thiazole	Lecture	BP401T.3	Mid Term-2, Seminar, Quiz & End Sem Exam
45	Quinoline and Isoquinoline	Lecture	BP401T.3 & BP401T.4	Mid Term-2, Quiz & End Sem Exam
46	Acridine and Indole	Lecture	BP401T.3 & BP401T.4	Mid Term-2, Quiz & End Sem Exam
47	Basicity of pyridine	Lecture	BP401T.3 & BP401T.4	Mid Term-2, Quiz & End Sem Exam
48	<i>Tutorial class</i> Basicity of pyridine	Lecture	BP401T.3 & BP401T.4	Mid Term-2, Seminar, Quiz & End Sem Exam
49	Synthesis and medicinal uses of Pyrimidine, Purine, azepines	Lecture	BP401T.3 & BP401T.4	Mid Term-2, Quiz & End Sem Exam
50	Metal hydride reduction	Lecture	BP401T.5	Mid Term-2, Quiz & End Sem Exam
51	Clemmensen reduction	Lecture	BP401T.5	Mid Term-2, Quiz & End Sem Exam
52	<i>Tutorial class</i> Metal hydride reduction	Lecture	BP401T.5	Mid Term-2, Assignment, Quiz & End Sem Exam
53	Birch reduction	Lecture	BP401T.5	Mid Term-2, Quiz & End Sem Exam
54	Wolff Kishner reduction	Lecture	BP401T.5	Mid Term-2, Quiz & End Sem Exam
55	Oppenauer-oxidation	Lecture	BP401T.5	Mid Term-2, Quiz & End Sem Exam
56	<i>Tutorial class</i> Wolff Kishner reduction	Lecture	BP401T.5	Mid Term-2, Quiz & End Sem Exam



57	Dakin reaction.	Lecture	BP401T.5	Mid Term-2, Quiz & End Sem Exam
58	Beckmanns rearrangement	Lecture	BP401T.5	Mid Term-2, Quiz & End Sem Exam
59	Schmidt rearrangement and Claisen-Schmidt condensation	Lecture	BP401T.5	Mid Term-2, Quiz & End Sem Exam
60	<i>Tutorial class</i> Claisen-Schmidt condensation	Lecture	BP401T.5	Mid Term-2, Seminar, Quiz & End Sem Exam

### I. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES											
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	
<b>BP401T.1.</b>	Students will be able to study optical isomerism of compounds that could help the students to understand the chirality, sequence rules, racemic modification of organic compounds.	3	3	3	2						1		2
<b>BP401T.2.</b>	Students will be able to <b>acquire</b> knowledge about geometrical isomerism of pharmaceutical organic compounds, with emphasis on their synthetic process, physical and chemical properties.	3	3	3	3					2			2
<b>BP401T.3.</b>	Students will be able to <b>write</b> synthesis, reactions and medicinal uses	3	3	3	3					3			2





	different heterocyclic compounds.													
<b>BP401T.4.</b>	Students will be able to analyze various reactions for the synthesis of higher organic compounds.	3	3	3	2					2	2			2
<b>BP401T.5.</b>	Students will be able to <b>apply</b> reagents and various named reactions for the design of organic medicinal compounds.	3	3	3	3					2	2			3

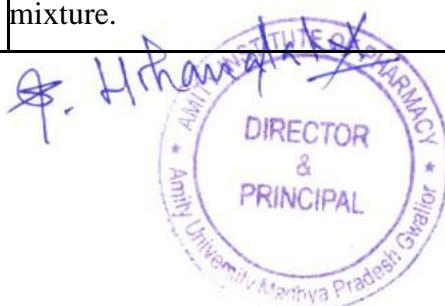
*A. H. Hanumanth*



DIRECTOR  
&  
PRINCIPAL

## Sample Question Paper

Amity Institute of pharmacy Department of Pharmaceutical Chemistry I MID-SEMESTER (SEM –IV) 2023-24						
Class: B. Pharmacy IV Semester						
Subject Name: BP401T PHARMACEUTICAL ORGANIC CHEMISTRY-III		Time: 1 Hr			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.4,5	Q.2,3,6,7,8,9	Q.4	Q. 1.0	Q.10	
<p>Student will be</p> <p><b>CO.1.</b> Students will be able to <b>study</b> optical isomerism of compounds that could help the students to understand the chirality, sequence rules, racemic modification of organic compounds.</p> <p><b>CO.2.</b> Students will be able to <b>acquire</b> knowledge about geometrical isomerism of pharmaceutical organic compounds, with emphasis on their synthetic process, physical and chemical properties.</p> <p><b>CO.3.</b> Students will be able to <b>write</b> synthesis, reactions and medicinal uses different heterocyclic compounds.</p> <p><b>CO.4.</b> Students will be able to <b>analyze</b> various reactions for the synthesis of higher organic compounds.</p> <p><b>CO.5.</b> Students will be able to <b>apply</b> reagents and various named reactions for the design of organic medicinal compounds.</p>						
CO Map	Question No.	Question				Marks
CO3	Q.1	Assign the D and L Nomenclature of given structure				2
CO5	Q.2	Identify the given compounds are E/Z nomenclature.				2
	Q.3	Identify the give compounds are Syn/anti geometrical isomerism				2
CO3	Q.4	Enlist the name of methods of resolution of racemic mixture.				2



CO5	Q.5	Mentions the difference between Meso compounds and Racemic Mixtures	2
CO4	Q.6	Define conformer. Explain the Staggered, Eclipsed, Gauche and anti-conformations of butane	10
	Q.7	. Explain in brief about stereoselective and stereospecific reactions with examples	10
CO3	Q 8	Discuss conditions required for optical activity? Identify the given compounds optically active or Inactive with justification.	5
CO4&C O4	Q.9	What is Cahn-Ingold-Prelog priority (CIP) rule: Determine the absolute configuration as R or S.	5
CO3&C O4	Q 10	Write a short note on Atropisomerism	5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**No Attainment Level:**

51.1% Percentage of students secured more than 60% marks, so this course: PHARMACEUTICAL ORGANIC CHEMISTRY-III : THEORY (BP401T) not attained any Level.





# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### Programme Outcomes:

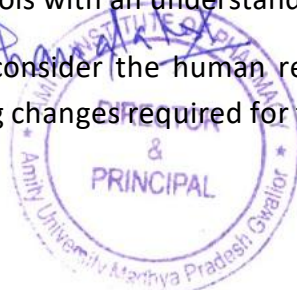
**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and



societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “-”



**PROGRAMME ARTICULATION  
MATRIX**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
I SEM																	
	BP103T		3	2	2	1	3	2	1	1	3	2					
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	




## DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

### Course Handout

Course : Medicinal Chemistry II – THEORY

Course Code : BP501T, Crédits : 04, Session :2023-24 (Odd Sem.), Class : B.Pharm. III Year

Faculty Name: Dr. Sathish K. Mittapalli

- A. Introduction:** The course is designed to impart fundamental knowledge on the preparatory pharmacy with arts and science of preparing the different conventional dosage forms.
- B. Course Outcomes:** At the end of the course, students will be able to:
- BP501T.1.** understand the chemistry of drugs with respect to their pharmacological activity
  - BP501T.2.** *understand the drug metabolic pathways, adverse effect and therapeutic value of drugs*
  - BP501T.3.** know the Structural Activity Relationship (SAR) of different class of drugs
  - BP501T.4.** develop analytical skills.
  - BP501T.5.** write the chemical synthesis of some drugs.
- C. Programme Outcomes:**
- [PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
- [PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
- [PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
- [PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
- [PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.
- [PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).



**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**D. Assessment Plan:**

<b>Component of Evaluation</b>	<b>Description</b>	<b>Code</b>	<b>Weightage %</b>
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	3%
	Student – Teacher interaction	S-T I	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

*[Handwritten Signature]*  




## E. Syllabus

### UNIT – I

Doxylamines succinate, Clemastine fumarate, Diphenylpyraline hydrochloride, Tripelenamine hydrochloride, Chlorcyclizine hydrochloride, Meclizine hydrochloride, Buclizine hydrochloride, Chlorpheniramine maleate, Triprolidine hydrochloride\*, Phenidamine tartarate, Promethazine hydrochloride\*, Trimeprazine tartrate, Cyproheptadine hydrochloride, Azatidine maleate, Astemizole, Loratadine, Cetirizine, Levocetrazine Cromolyn sodium.

H<sub>2</sub>-antagonists: Cimetidine\*, Famotidine, Ranitidin.

Gastric Proton pump inhibitors: Omeprazole, Lansoprazole, Rabeprazole,

Pantoprazole Anti-neoplastic agents: Alkylating agents: Meclorothamine\*, Cyclophosphamide, Melphalan Chlorambucil, Busulfan, Thiotepa.

**Antimetabolites:** Mercaptopurine\*, Thioguanine, Fluorouracil, Floxuridine, Cytarabine, Methotrexate\*, Azathioprine

**Antibiotics:** Dactinomycin, Daunorubicin, Doxorubicin, Bleomycin **Plant products:** Etoposide, Vinblastin sulphate, Vincristin sulphate **Miscellaneous:** Cisplatin.

### UNIT – II

Anti-anginal:

Vasodilators: Amyl nitrite, Nitroglycerin, Pentaerythritol tetranitrate, Isosorbide dinitrite\*, Dipyridamole.

Calcium channel blockers: Verapamil, Bepridil hydrochloride, Diltiazem hydrochloride, Nifedipine, Amlodipine, Felodipine, Nicardipine, Nimodipine. Anti-hypertensive Agents: Timolol, Captopril, Lisinopril, Enalapril, Benazepril

hydrochloride, Quinapril hydrochloride, Methyldopate hydrochloride, Clonidine hydrochloride, Guanethidine monosulphate, Guanabenz acetate, Sodium nitroprusside, Diazoxide, Minoxidil, Reserpine, Hydralazine hydrochloride.

### UNIT – III

Anti-arrhythmic Drugs: Quinidine sulphate, Procainamide hydrochloride, Disopyramide phosphate\*, Phenytoin sodium, Lidocaine hydrochloride, Tocainide hydrochloride, Mexiletine hydrochloride, Lorcaïnide hydrochloride, Amiodarone, Sotalol.

Anti-hyperlipidemic agents: Clofibrate, Lovastatin, Cholesteramine and Cholestipol

Coagulant & Anticoagulants: Menadione, Acetomenadione, Warfarin\*, Anisindione, clopidogrel

Drugs used in Congestive Heart Failure: Digoxin, Digitoxin, Nesiritide,

Bosentan, Tezosentan

### UNIT – IV

Drugs acting on Endocrine system Nomenclature, Stereochemistry and metabolism of steroids

Sex hormones: Testosterone, Nandrolone, Progesterones, Oestriol, Oestradiol,

Oestrione, Diethyl stilbestrol. Drugs for erectile dysfunction: Sildenafil, Tadalafil.

Oral contraceptives: Mifepristone, Norgestrel, Levonorgestrol Corticosteroids: Cortisone, Hydrocortisone, Prednisolone, Betamethasone, Dexamethasone

Thyroid and antithyroid drugs: L-Thyroxine, L-Thyronine, Propylthiouracil, Methimazole.

### UNIT – V

#### Antidiabetic agents:

Insulin and its preparations Sulfonyl ureas: Tolbutamide\*, Chlorpropamide, Glipizide, Glimepiride.

Biguanides: Metformin. Narcotic antagonists: Nalorphine hydrochloride, Levallorphan tartarate, Naloxone hydrochloride.

Anti-inflammatory agents: Sodium salicylate, Aspirin, Mefenamic acid\*, Meclofenamate, Indomethacin, Sulindac, Tolmetin, Zomepirac, Diclofenac, Ketorolac, Ibuprofen\*, Naproxen, Piroxicam, Phenacetin, Acetaminophen, Antipyrine, Phenylbutazone.



**Examination Scheme:**

Components	A	CT	S/V/Q/HA	STI	EE
Weightage (%)	4	15	3	3	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination; A: Attendance

**A. Suggested Text/Reference Books:**

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
2. Foye's Principles of Medicinal Chemistry.
3. Burger's Medicinal Chemistry, Vol I to IV.
4. Introduction to principles of drug design- Smith and Williams.
5. Remington's Pharmaceutical Sciences.
6. Martindale's extra pharmacopoeia.
7. Organic Chemistry by I.L. Finar, Vol. II.
8. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1 to 5.
9. Indian Pharmacopoeia.
10. Text book of practical organic chemistry- A.I.Vogel.

**Lecture Plan**

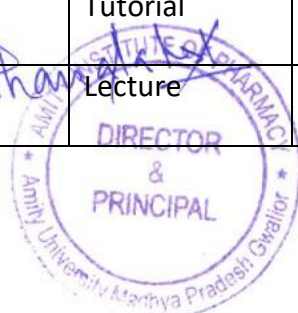
Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	<b>Scope and objectives:</b> This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs. The syllabus also emphasizes on chemical synthesis of important drugs under each class.	Lecture	1,5	Mid Term-1, Quiz & End Sem Exam
2	<b>Antihistaminic agents:</b> Histamine, receptors and their distribution in the human body	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
3	<b>H<sub>1</sub>-antagonists:</b> Diphenhydramine hydrochloride*, Dimenhydrinate, Doxylamines succinate, Clemastine fumarate, Diphenylpyraline hydrochloride	Lecture	1	Mid Term-1, Quiz & End Sem Exam



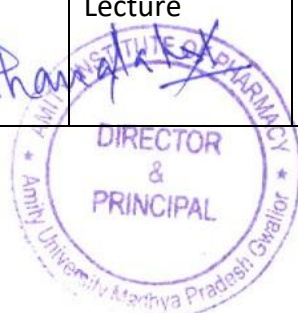
4	<i>Tripelenamine hydrochloride, Chlorcyclizine hydrochloride, Meclizine hydrochloride, Buclizine hydrochloride, Chlorpheniramine maleate, Triprolidine hydrochloride*</i>	Tutorial	1	Mid Term-1, Quiz & End Sem Exam
5	Phenidamine tartarate, Promethazine drochloride*, Trimeprazine tartrate, Cyproheptadine hydrochloride, Azatidine maleate, Astemizole, Loratadine, Cetirizine, Levocetrazine Cromolyn sodium	Lecture	2	Mid Term-1, Quiz & End Sem Exam
6	<b>H<sub>2</sub>-antagonists:</b> Cimetidine*, Famotidine, Ranitidin.	Lecture	1, 2	Mid Term-1, Quiz & End Sem Exam
7	<b>Gastric Proton pump inhibitors:</b> Omeprazole, Lansoprazole, Rabeprazole, Pantoprazole	Lecture	2	Mid Term-1, Quiz & End Sem Exam
8	<b>Anti-neoplastic agents:</b> <b>Alkylating agents:</b> Meclorothamine*, Cyclophosphamide, Melphalan, Chlorambucil, Busulfan, Thiotepa	Tutorial	3	Mid Term-1, Quiz & End Sem Exam
9	<b>H<sub>2</sub>-antagonists:</b> Cimetidine*, Famotidine, Ranitidin.	Lecture	3,4	Mid Term-1, Quiz & End Sem Exam
10	<b>Gastric Proton pump inhibitors:</b> Omeprazole, Lansoprazole, Rabeprazole, Pantoprazole	Lecture	4	Mid Term-1, Quiz & End Sem Exam
11	<b>Anti-neoplastic agents:</b> <b>Alkylating agents:</b> Meclorothamine*, Cyclophosphamide, Melphalan, Chlorambucil, Busulfan, Thiotepa	Lecture	2, 5	Mid Term-1, Quiz & End Sem Exam
12	<b>Antimetabolites:</b> Mercaptopurine*, Thioguanine, Fluorouracil, Floxuridine, Cytarabine, Methotrexate*, Azathioprine	Tutorial	4	Mid Term-1, Quiz & End Sem Exam
13	<b>Antibiotics:</b> Dactinomycin, Daunorubicin, Doxorubicin, Bleomycin	Lecture	5	Mid Term-1, Quiz & End Sem Exam
14	<b>Calcium channelblockers:</b> Verapamil, Bepridilhydrochloride, Diltiazem hydrochloride, Nifedipine,	Lecture	5	Mid Term-1, Quiz & End Sem Exam



	Amlodipine, Felodipine, Nicardipine, Nimodipine.			
15	<b>Anti-hypertensive Agents:</b> Timolol, Captopril, Lisinopril, Enalapril, Benazepril hydrochloride, Quinapril hydrochloride, Methyldopate hydrochloride,* Clonidine hydrochloride, Guanethidine monosulphate, Guanabenz acetate, Sodium nitroprusside, Diazoxide, Minoxidil, Reserpine, Hydralazine hydrochloride.	Lecture	1,5	Mid Term-1, Quiz & End Sem Exam
16	<b>Calcium channelblockers:</b> Verapamil, Bepridilhydrochloride, Diltiazem hydrochloride, Nifedipine, Amlodipine, Felodipine, Nicardipine, Nimodipine.	Tutorial	4	Mid Term-1, Quiz & End Sem Exam
17	<b>Anti-arrhythmic Drugs:</b> Quinidine sulphate, Procainamide hydrochloride, Disopyramide phosphate*, Phenytoin sodium, idocaine hydrochloride, Tocainide hydrochloride, Mexiletine hydrochloride, Lorcainide hydrochloride, Amiodarone, Sotalol.	Lecture	5	Mid Term-1, Quiz & End Sem Exam
18	<b>Anti-hyperlipidemic agents:</b> Clofibrate, Lovastatin, Cholesteramine and Cholestipol	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
19	<b>Anticoagulants:</b> Menadione, Acetomenadione, Warfarin*, Anisindione, clopidogrel	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
20	<b>Drugs acting on Endocrine system</b> Nomenclature, Stereochemistry and metabolism of steroids	Tutorial	3	Mid Term-1, Quiz & End Sem Exam
21	<b>Sex hormones:</b> Testosterone, Nandralone, Progestrones, Oestriol, Oestradiol, Oestrione, Diethyl stilbestrol.	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
22	<b>Drugs for erectile dysfunction:</b> Sildenafil, Tadalafil.	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
23	<b>Oral contraceptives:</b> Mifepristone, Norgestril, Levonorgestrol	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
24	Quiz	Tutorial		Mid Term-1, Quiz & End Sem Exam
25	Cholinergic neurotransmitters:	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam



	Biosynthesis and catabolism of acetylcholine.			
26	Cholinergic receptors (Muscarinic & Nicotinic)	Lecture	Unit-3	Mid Term-1, Quiz & End Sem Exam
27	A Parasympathomimetic agents:	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
28	preparation, procedure, methods of detection	Tutorial	2	Mid Term-1, Quiz & End Sem Exam
29	B SAR of Parasympathomimetic agents	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
30	Direct acting agents: Acetylcholine, Carbachol*, Bethanechol, Methacholine,	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
31	C) Paper chromatography : theory of partition, different techniques employed filter papers,	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
32	Indirect acting/ Cholinesterase inhibitors (Reversible & Irreversible):	Tutorial	2	Mid Term-2, Quiz & End Sem Exam
33	Physostigmine, Neostigmine*, Pyridostigmine,	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
34	Edrophonium chloride, Tacrine hydrochlorid	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
35	Cholinergic Blocking agents: SAR of cholinolytic agents	Lecture	4	Mid Term-2, Quiz & End Sem Exam
36	Seminar	Tutorial		Mid Term-2, Quiz & End Sem Exam
37	Solanaceous alkaloids and analogues: Atropine sulphate	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
38	, Hyoscyamine sulphate, Scopolamine hydrobromide, Homatropine	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
39	hydrobromide, Ipratropium bromide*	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
40	Unit test	Tutorial		Mid Term-2, Quiz & End Sem Exam
41	A) Synthetic cholinergic blocking agents: Tropicamide, Cyclopentolate hydroch	Lecture	4	Mid Term-2, Quiz & End Sem Exam



	loride, Clidinium bromide,			
42	study & working principles of instrumentation	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
43	Dicyclomine hydrochloride*, Glycopyrrolate, Methantheline bromide,	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
44	Seminar	Tutorial		Mid Term-2, Quiz & End Sem Exam
45	Propantheline bromide, Benzotropine mesylate,	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
46	Orphenadrine citrate, Biperidine hydrochloride, Procyclidine hydrochloride*	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
47	applications	Lecture	2,3	Quiz & End Sem Exam
48	Quiz	Tutorial		Quiz & End Sem Exam
49	<i>sedatives and Hypnotics: Benzodiazepines: SAR of Benzodiazepines, Chlordiazepoxide,</i>	Lecture	2,3	Quiz & End Sem Exam
50	<i>Diazepam*, Oxazepam, Chlorazepate, Lorazepam, Alprazolam</i>	Lecture	2,3	Quiz & End Sem Exam
51	<i>applications</i>	Lecture	2,3	Quiz & End Sem Exam
52	<b>Anti-arrhythmic Drugs:</b> Quinidine sulphate, Procainamide hydrochloride, Disopyramide phosphate*, Phenytoin sodium, Lidocaine hydrochloride, Tocainide hydrochloride, Mexiletine hydrochloride, Lorcaïnide hydrochloride, Amiodarone, Sotalol.	Tutorial	2	Quiz & End Sem Exam
53	<b>Anti-hyperlipidemic agents:</b> Clofibrate, Lovastatin, Cholesteramine and Cholestipol	Lecture	2,3	Quiz & End Sem Exam
54	Quiz	Tutorial		Quiz & End Sem Exam
55	<b>Drugs used in Congestive Heart Failure:</b> Digoxin, Digitoxin, Nesiritide, Bosentan, Tezosentan.	Lecture	2,3	Quiz & End Sem Exam



56	<b>Anti-arrhythmic Drugs:</b> Quinidine sulphate, Procainamide hydrochloride, Disopyramide phosphate*, Phenytoin sodium, Lidocaine hydrochloride, Tocainide hydrochloride, Mexiletine hydrochloride, Lorainide hydrochloride, Amiodarone, Sotalol.	Tutorial	2	Quiz & End Sem Exam
57	applications	Lecture	2,3	Quiz & End Sem Exam
58	<b>Thiazolidinediones:</b> Pioglitazone, Rosiglitazone	Lecture	2,3	Quiz & End Sem Exam
59	<b>Meglitinides:</b> Repaglinide, Nateglinide	Lecture	2,3	Quiz & End Sem Exam
60	Piperacetazine hydrochloride, Prochlorperazine maleate, Trifluoperazine hydrochloride.	Tutorial	1,5	Quiz & End Sem Exam
61	<b>Lidocaine/Anilide derivatives:</b> Lignocaine, Mepivacaine, Prilocaine, Etidocaine.	Lecture	2	
62	<b>Miscellaneous:</b> Phenacaine, Dipiperodon, Dibucaine.	Lecture	2	

### B. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES											CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES				
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3	
<b>BP501T.1</b>	<b>BP103T.1.</b> understand the chemistry of drugs with respect to their pharmacological activity	3	2	-	-	2	2	1	-	1	-	-					



<b>BP501T.2.</b>	<b>BP103T.2.</b> <i>understand the drug metabolic pathways, adverse effect and therapeutic value of drugs</i>	3	-	-	1	-	2	-	-	-	-	3				
<b>BP501T.3.</b>	<b>BP103T.3.</b> know the Structural Activity Relationship (SAR) of different class of drugs	3	2	-	3	-	2	-	-	-	-	3				
<b>BP501T.4.</b>	<b>BP103T.4.</b> Able to emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs.	2	2	3	3	-	1	-	-	-	-	3				
<b>BP501T.5.</b>	<b>BP103T.5.</b> Emphasizes on chemical synthesis of important drugs under each class.	1	-	3	-	-	-	-	-	-	-	3				

### Sample Question Paper

Amity Institute of Pharmacy Department of PHARMACEUTICAL CHEMISTRY I MID-SEMESTER (SEM –V ) 2023-24						
Class: B.Pharm, I Semester						
Subject Name: BP103T Pharmaceutics-I Theory		Time: 1 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,3,4,5	Q.6,8,9	Q.2	Q.7, 10		
The student will be able to						




- CO1.** understand the chemistry of drugs with respect to their pharmacological activity  
**CO2.** Understand the principles of volumetric and electro chemical analysis.  
**CO3** understand the drug metabolic pathways, adverse effect and therapeutic value of Drug.  
**CO4.** develop analytical skills.  
**CO5.** Solve the dose calculation, pharmaceutical calculations.

CO Map	Question No.	Question	Marks
CO4	Q.1	Concept of Drug metabolism	2
CO5	Q.2	Different techniques of analysis	2
CO1	Q.3	Anti-hypertensive Agents: Timolol, Captopril, Lisinopril, Enalapril, Benazepril hydrochloride, Quinapril hydrochloride.	2
CO2	Q.4	Drugs acting on Autonomic Nervous System	2
CO2	Q.5	Indirect acting agents: Hydroxyamphetamine, Pseudoephedrine, Propylhexedrine	2
CO1	Q.6	Summarize the different career options available in the pharmaceutical industry.	10
CO4	Q.7	Sympathomimetic agents: SAR of Sympathomimetic agents	10
CO3	Q.8	Theories to know the Structural Activity Relationship (SAR) of different class of drugs	5
CO2	Q.9	physicochemical properties and metabolism of drugs.	5
CO4	Q.10	Drugs acting on Central Nervous System	5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**No Attainment Level:**

54.3 % Percentage of students secured more than 60% marks, so this course MEDICINAL CHEMISTRY-II – THEORY (BP501T) not attained any Level.



*[Handwritten Signature]*





AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

AMITY INSTITUTE OF PHARMACY

## PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) AND PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

Bachelor of Pharmacy (B. Pharm.) Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application various physicochemical properties of drug molecules in the designing the dosage form.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### Programme Outcomes(POs)::

**[PO.1].Pharmacy Knowledge:** Posses knowledge and compression of the core and basic knowledge assoctied with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team -building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well- being



**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self- assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of preformulation properties i.e. solubility, melting point, partition coefficients etc in the field of designing the pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety physicochemical property in the formulation development and evaluation of dosage form and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)



**PROGRAMME ARTICULATION  
MATRIX**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
VI SEM	BP403T	3	3	3	3	1	2	2	1	3	1	1	3	3	3	

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DIRECTOR  
&  
PRINCIPAL



# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

<b>DEPARTMENT OF PHARMACY</b>
<b>Course Handout</b>
Course : Physcial Pharmacy (Theory)
Course Code : BP403T, Crédits : 04, Session : 2023-24 (Even Sem.), Class : B. Pharm. 2 <sup>nd</sup> Year
Faculty Name : Dr. Neeraj Mishra

**A. Introduction:** This course is designed to impart fundamental knowledge on pharmaceutical product development and translation from laboratory to market. Upon completion of the course, the student shall be able to:

1. Know the process of pilot plant and scale up of pharmaceutical dosage forms
2. Understand the process of technology transfer from lab scale to commercial batch
3. Know different Laws and Acts that regulate pharmaceutical industry
4. Understand the approval process and regulatory requirements for drug products

**B. Course Outcomes:** At the end of the course, students will be able to:

**BP403T.1.** Understand various physicochemical properties of drug molecules in the designing the dosage forms

**BP403T.2.** Know the principles of chemical kinetics & to use them for stability testing

**BP403T.3.** Discuss the use of chemical kinetics in determination of expiry date of formulations

**BP403T.4.** Demonstrate use of physicochemical properties in the formulation development

**BP403T.5.** Understand the evaluation parameters of dosage form

**C. Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Posses knowledge and compression of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills.



Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team -building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well- being.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

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**[PO.11]. Life-long learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self- assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.



#### D. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves Including medical leaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
<b>Total</b>			<b>100%</b>

Q: Quiz, A: Assignment, OBT: Open book test, FW: Field work, GD: Group discussion, S: Seminar

#### E. Syllabus

##### Module I

a) **Colloidal dispersions:** Classification of dispersed systems & their general characteristics, size & shapes of colloidal particles, classification of colloids & comparative account of their general properties. Optical, kinetic & electrical properties. Effect of electrolytes, coacervation, peptization & protective action.

##### Module II

**Rheology:** Newtonian systems, law of flow, kinematic viscosity, effect of temperature, non-Newtonian systems, pseudoplastic, dilatant, plastic, thixotropy, thixotropy in formulation, determination of viscosity, capillary, falling Sphere, rotational viscometers

**Deformation of solids:** Plastic and elastic deformation, Heckel equation, Stress, Strain, Elastic Modulus

##### Module III

**Coarse dispersion:** Suspension, interfacial properties of suspended particles, settling in suspensions, formulation of flocculated and deflocculated suspensions. Emulsions and





theories of emulsification, microemulsion and multiple emulsions; Stability of emulsions, preservation of emulsions, rheological properties of emulsions and emulsion formulation by HLB method.

#### Module IV

**Micromeritics:** Particle size and distribution, mean particle size, number and weight distribution, particle number, methods for determining particle size by different methods, counting and separation method, particle shape, specific surface, methods for determining surface area, permeability, adsorption, derived properties of powders, porosity, packing arrangement, densities, bulkiness & flow properties.

#### Module V

**Drug stability:** Reaction kinetics: zero, pseudo-zero, first & second order, units of basic rate constants, determination of reaction order. Physical and chemical factors influencing the chemical degradation of pharmaceutical product: temperature, solvent, ionic strength, dielectric constant, specific & general acid base catalysis, Simple numerical problems. Stabilization of medicinal agents against common reactions like hydrolysis & oxidation. Accelerated stability testing in expiration dating of pharmaceutical dosage forms. Photolytic degradation and its prevention

#### F. Examination Scheme:

Components	CT	A	Q/A/OBT/FW/GD/S	STI	EE
Weightage (%)	15	4	3	3	75

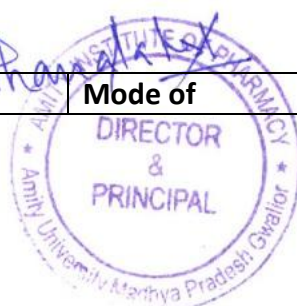
CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

#### G. Suggested Text/Reference Books:

1. Physical Pharmacy by Alfred Martin, Sixth edition
2. Experimental pharmaceutics by Eugene, Parott.
3. Tutorial pharmacy by Cooper and Gunn.
4. Stocklosam J. Pharmaceutical calculations, Lea & Febiger, Philadelphia.
5. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, Marcel Dekkar Inc.
6. Liberman H.A, Lachman C, Pharmaceutical dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc.
7. Physical Pharmaceutics by Ramasamy C, and Manavalan R.

#### H. Lecture Plan

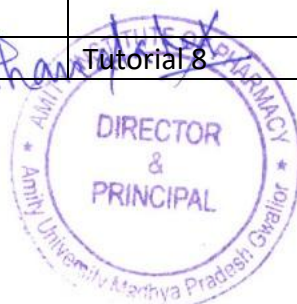
Lect	Topics	Mode of	Correspondi	Mode of
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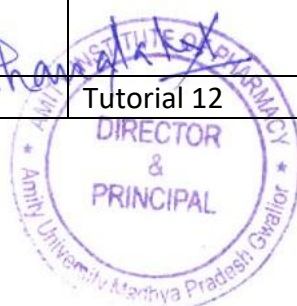
ure		Delivery	ng CO	Assessing CO
1	Classification of dispersed systems	Lecture	BP403T.1	Mid Term-1, Quiz & End Sem Exam
2	General characteristics, size & shapes of colloidal particles	Lecture	BP403T.1	Mid Term-1, Quiz & End Sem Exam
3	Classification of colloids & comparative account of their general properties	Lecture	BP403T.1	Mid Term-1, Quiz & End Sem Exam
4	Tutorial 1	Tutorial 1	BP403T.1	
5	Optical and kinetic properties of colloids	Lecture	BP403T.1	Mid Term-1, Quiz & End Sem Exam
6	Electrical, kinetic properties of colloids	Lecture	BP403T.1	Mid Term-1, Quiz & End Sem Exam
7	Effect of electrolytes, coacervation,	Lecture	BP403T.1	Mid Term-1, Quiz & End Sem Exam
8	Tutorial 2	Tutorial 1	BP403T.1	
7	Peptization of colloids	Lecture	BP403T.1	Mid Term-1, Quiz & End Sem Exam
8	Protective action of colloids	Lecture	BP403T.1	Mid Term-1, Quiz & End Sem Exam
9	Newtonian systems and law of flow	Lecture	BP403T.2	Mid Term-1, Quiz & End Sem Exam
10	kinematic viscosity, effect of temperature,	Lecture	BP403T.2	Mid Term-1, Quiz & End Sem Exam
11	non-Newtonian systems, Dilatant	Lecture	BP403T.2	Mid Term-1, Quiz & End Sem Exam
12	Tutorial 3	Tutorial 1	BP403T.2	
13	Plastic and Pseudoplastic	Lecture	BP403T.2	
14	Thixotropy and its importance in pharmacy	Lecture	BP403T.2	Mid Term-1, Quiz & End Sem Exam



15	Thixotropy determination in pharmacy	Lecture	BP403T.2	Mid Term-1, Quiz & End Sem Exam
16	Tutorial 4	Tutorial 1	BP403T.2	
17	Determination of viscosity by capillary viscometer	Lecture	BP403T.2	Mid Term-1, Quiz & End Sem Exam
18	Determination of viscosity by falling Sphere, rotational viscometers	Lecture	BP403T.2	Mid Term-1, Quiz & End Sem Exam
19	Plastic and elastic deformation	Lecture	BP403T.2	Mid Term-1, Quiz & End Sem Exam
20	Tutorial 5	Tutorial 5	BP403T.2	
21	Heckel equation	Lecture	BP403T.2	Mid Term-1, Quiz & End Sem Exam
22	Stress, Strain and Elastic Modulus	Lecture	BP403T.2	Mid Term-1, Quiz & End Sem Exam
23	Suspension	Lecture	BP403T.3	Mid Term-2, Quiz & End Sem Exam
24	Tutorial 6	Tutorial 6	BP403T.3	
25	Interfacial properties of suspended particles	Lecture	BP403T.3	Mid Term-2, Quiz & End Sem Exam
26	Settling in suspensions	Lecture	BP403T.3	Mid Term-2, Quiz & End Sem Exam
27	Flocculated and deflocculated suspensions.	Lecture	BP403T.3	Mid Term-2, Quiz & End Sem Exam
28	Tutorial 7	Tutorial 7	BP403T.3	
29	Formulation of suspensions	Lecture	BP403T.3	Mid Term-2, Quiz & End Sem Exam
30	Emulsions	Lecture	BP403T.3	Mid Term-2, Quiz & End Sem Exam
31	Theories of emulsification	Lecture	BP403T.3	Mid Term-2, Quiz & End Sem Exam
32	Tutorial 8	Tutorial 8	BP403T.3	



33	Microemulsion and multiple emulsions,	Lecture	BP403T.3	Mid Term-2, Quiz & End Sem Exam
34	Stability of emulsions	Lecture	BP403T.3	Mid Term-2, Quiz & End Sem Exam
35	Preservation of emulsions	Lecture	BP403T.3	Mid Term-2, Quiz & End Sem Exam
36	Tutorial 9	Tutorial 9	BP403T.9	
37	Rheological properties of emulsions	Lecture	BP403T.3	Mid Term-2, Quiz & End Sem Exam
38	emulsion formulation by HLB method.	Lecture	BP403T.3	Mid Term-2, Quiz & End Sem Exam
39	Particle size and distribution, mean particle size	Lecture	BP403T.3	Mid Term-2, Quiz & End Sem Exam
40	Tutorial 10	Tutorial 10	BP403T.3	
41	Number and weight distribution, particle number	Lecture	BP403T.4	Mid Term-2, Quiz & End Sem Exam
42	Methods for determining particle size by different methods, counting and separation method, particle shape, specific surface	Lecture	BP403T.4	Mid Term-2, Quiz & End Sem Exam
43	Methods for determining surface area	Lecture	BP403T.4	Mid Term-2, Quiz & End Sem Exam
44	Tutorial 11	Tutorial 11	BP403T.4	
45	Methods for determining permeability and absorption	Lecture	BP403T.4	Mid Term-2, Quiz & End Sem Exam
46	Porosity, packing arrangement	Lecture	BP403T.4	Mid Term-2, Quiz & End Sem Exam
47	Densities, bulkiness, and Flow properties	Lecture	BP403T.4	Mid Term-2, Quiz & End Sem Exam
48	Tutorial 12	Tutorial 12	BP403T.4	



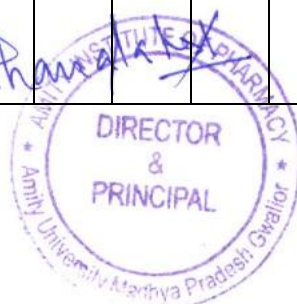
49	Drug Stability and Reaction kinetics: zero, pseudo-zero	Lecture	BP403T.5	Mid Term-2, Quiz & End Sem Exam
50	First & second order, units of basic rate constants	Lecture	BP403T.5	Mid Term-2, Quiz & End Sem Exam
51	Determination of reaction order	Lecture	BP403T.5	Mid Term-2, Quiz & End Sem Exam
52	Tutorial 13	Tutorial 13	BP403T.5	
53	Physical and chemical factors influencing the chemical degradation of pharmaceutical product: temperature, solvent, ionic strength, dielectric constant	Lecture	BP403T.5	Mid Term-2, Quiz & End Sem Exam
54	specific & general acid base catalysis, Simple numerical problems.	Lecture	BP403T.5	Mid Term-2, Quiz & End Sem Exam
55	Stabilization of medicinal agents against common reactions like hydrolysis & oxidation	Lecture	BP403T.5	Mid Term-2, Quiz & End Sem Exam
56	Tutorial 14	Tutorial 14	BP403T.5	
57	Accelerated stability testing in expiration dating of pharmaceutical dosage forms. Photolytic degradation and its prevention	Lecture	BP403T.5	Mid Term-2, Quiz & End Sem Exam
58	Accelerated stability testing in expiration dating of pharmaceutical dosage forms. Photolytic	Lecture	BP403T.5	Mid Term-2, Quiz & End Sem Exam



	degradation and its prevention			
59	Accelerated stability testing in expiration dating of pharmaceutical dosage forms. Photolytic degradation and its prevention	Lecture	BP403T.5	Mid Term-2, Quiz & End Sem Exam
60	Tutorial 15	Tutorial 15	BP403T.5	

**I. Course Articulation Matrix (Mapping of COs with POs)**

C O	S T A T E M E N T	CORRELATION WITH PROGRAMME OUTCOMES											CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P O 13	P O 14	P O 15
<b>BP403T.1</b>	<i>Understand various physicochemical properties of drug molecules in the designing the dosage</i>	3	3	3	1	-	1	2	1	-	-	1	3	2	3	



	<i>e forms</i>														
<b>B P 4 O 3 T . 2</b>	Know the principles of chemical kinetics & to use them for stability testing	2	2	2	3	-	1	1	1	-	-	1	3	3	3
<b>B P 4 O 3 T . 3</b>	<i>Discuss the use of chemical kinetics in determination of expiry date of formulations</i>	2	1	1	-	-	1	3	2	-	-	-	3	3	2
<b>B P 4 O 3 T . 4</b>	<i>Demonstrate use of physico chemical properties in the formulation development</i>	2	2	2	1	-	1	-	-	-	-	-	0	3	2

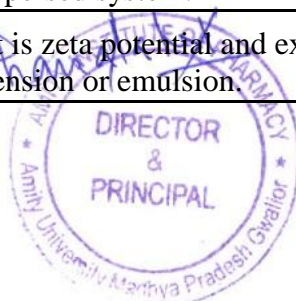
*S. Hirani*

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 Amity University, Madhya Pradesh Gwalior

B P 4 0 3 T .5	Understand the evaluation parameters of dosage form	2	1	-	-	-	2	1	1	-	-	1	3	3	2

### Sample Question Paper

Amity Institute of Pharmacy Department of Pharmaceutics I MID-SEMESTER (SEM-IV) 2023-24						
Class: B. Pharm IV Semester						
Subject Name: Industrial Pharmacy I– Theory		Time: 1 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q. 1,3,5	Q. 2,4	Q. 7,8,9		Q. 10	
Student will be able to CO1: Outline the assessment of physicochemical properties of drugs as a tool in the optimization of solid, liquid oral and parenteral dosage forms and its impact on stability of dosage forms. CO2: Demonstrate tablets, capsules, liquid orals, cosmetics using established procedures and technology.						
CO Map	Question No.	Question				Marks
CO1	Q.1	What is stokes' law and discuss its significance in suspension.				2
CO2	Q.2	Define non- Newtonian systems with examples.				2
	Q.3	What is thixotropy and explain its importance in dispersed system.				2
CO2	Q.4	What is zeta potential and explain its role in stability of suspension or emulsion.				2





CO2	Q.5	Define the elastic and plastic deformation.	2
CO1	Q.6	Discuss the methods for determining particle size of powder.	10
	Q.7	Discuss the importance of Accelerated stability testing in expiration dating of pharmaceutical dosage forms.	
CO1	Q.8	Outline the effect of electrolytes on the stability of lyophobic colloids.	5
CO2	Q.9	Explain the formulation of flocculated and deflocculated suspensions.	5
CO2	Q.10	Discuss the methods for the determining surface area.	5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**Level-1 Attainment:**

60.62% Percentage of students secured more than 60% marks, so this course INDUSTRIAL PHARMACY I– THEORY (BP502T) attained Level-1.





# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACOLOGY

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### Programme Outcomes:

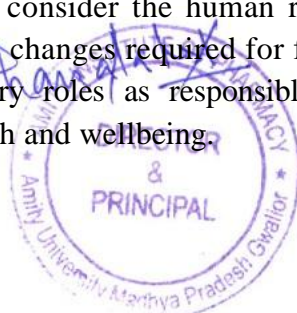
**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

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**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes:**

**PSO 1:** This subject is designed to understand what drugs do to the living organisms and how their effects can be applied to therapeutics.

**PSO 2:** The subject covers the information about the drugs like, mechanism of action, physiological and biochemical effects (pharmacodynamics)

**PSO 3:** This subject also cover the information about absorption, distribution, metabolism and excretion (pharmacokinetics) along with the adverse effects, clinical uses, interactions, doses, contraindications and routes of administration of different classes of drugs.

**PSO 4:** The subject provides the basic knowledge required to understand the various disciplines of pharmacy

**Note:** - Correlation levels 1, 2 and 3 as defined below:

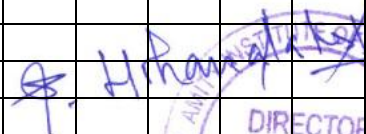
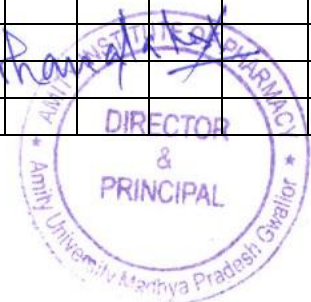
1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “- “



**PROGRAMME  
ARTICULATION MATRIX**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
II SEM																
III SEM																
IV SEM	BP404T		3	2	1	-	1	3	2	1	3	2	2			
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*[Signature]*





**Course Handout**

Course : PHARMACOLOGY – I THEORY

Course Code : BP404T, Crédits : 04, Session :2023-24 (Even Sem.), Class : B.Pharm. 2nd Year

Faculty Name: DR. NAVEEN SHARMA

**A. Introduction:** This course is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body. It also helps in understanding both homeostatic mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy

**B. Course Outcomes:** At the end of the course, students will be able to:

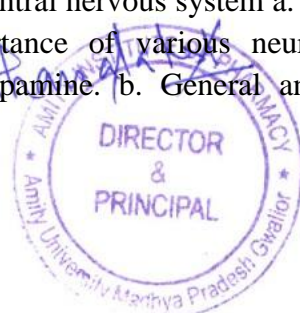
**BP404T.CO1.** a. Introduction to Pharmacology- Definition, historical landmarks and scope of pharmacology, nature and source of drugs, essential drugs concept and routes of drug administration, Agonists, antagonists( competitive and non competitive), spare receptors, addiction, tolerance, dependence, tachyphylaxis, idiosyncrasy, allergy. b. Pharmacokinetics- Membrane transport, absorption, distribution, metabolism and excretion of drugs .Enzyme induction, enzyme inhibition, kinetics of elimination.

**BP402T.CO2.** Pharmacodynamics- Principles and mechanisms of drug action. Receptor theories and classification of receptors, regulation of receptors. drug receptors interactions signal transduction mechanisms, G-protein–coupled receptors, ion channel receptor, transmembrane enzyme linked receptors, transmembrane JAK-STAT binding receptor and receptors that regulate transcription factors, dose response relationship, therapeutic index, combined effects of drugs and factors modifying drug action. b. Adverse drug reactions. c. Drug interactions (pharmacokinetic and pharmacodynamic) d. Drug discovery and clinical evaluation of new drugs -Drug discovery phase, preclinical evaluation phase, clinical trial phase, phases of clinical trials and pharmacovigilance.

**BP403T.CO3.** Pharmacology of drugs acting on peripheral nervous system a. Organization and function of ANS. b. Neurohumoral transmission, co-transmission and classification of neurotransmitters. c. Parasympathomimetics, Parasympatholytics, Sympathomimetics, sympatholytics. d. Neuromuscular blocking agents and skeletal muscle relaxants (peripheral). e. Local anesthetic agents. f. Drugs used in myasthenia gravis and glaucoma

**BP404T.CO4.**

Pharmacology of drugs acting on central nervous system a. Neurohumoral transmission in the C.N.S. special emphasis on importance of various neurotransmitters like with GABA, Glutamate, Glycine, serotonin, dopamine. b. General anesthetics and pre-anesthetics. c.



Sedatives, hypnotics and centrally acting muscle relaxants. d. Anti-epileptics e. Alcohols and disulfiram

**BP405T.CO5.** Pharmacology of drugs acting on central nervous system a. Psychopharmacological agents: Antipsychotics, antidepressants, anti-anxiety agents, anti-manics and hallucinogens. b. Drugs used in Parkinsons disease and Alzheimer's disease. c. CNS stimulants and nootropics. d. Opioid analgesics and antagonists e. Drug addiction, drug abuse, tolerance and dependence.

**C. Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

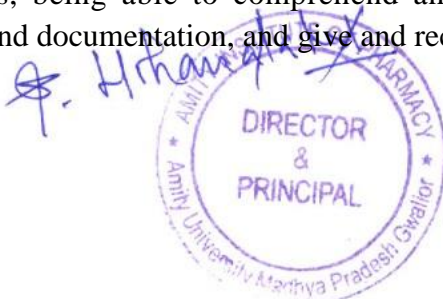
**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyse and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behaviour that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.



**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**D. Programme Specific Outcomes:**

**PSO 1:** Will be able to understand anatomy and physiology of human body system and how the human body maintain internal environment so that different organs perform work properly.

**PSO 2:** Will be able to give the information about how the cell communicate and maintain their functions and various disorders of different human organs so that we can give the appropriate therapy.

**PSO 3:** Will be able to understand organization at the different level of human body.

**Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	3%
	Student – Teacher interaction	S-T I	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>





## E. Syllabus

### Unit I

Introduction to Pharmacology- Definition, historical landmarks and scope of pharmacology, nature and source of drugs, essential drugs concept and routes of drug administration, Agonists, antagonists( competitive and non competitive), spare receptors, addiction, tolerance, dependence, tachyphylaxis, idiosyncrasy, allergy. b. Pharmacokinetics- Membrane transport, absorption, distribution, metabolism and excretion of drugs .Enzyme induction, enzyme inhibition, kinetics of elimination.

### Unit II

Pharmacodynamics- Principles and mechanisms of drug action. Receptor theories and classification of receptors, regulation of receptors. drug receptors interactions signal transduction mechanisms, G-protein–coupled receptors, ion channel receptor, transmembrane enzyme linked receptors, transmembrane JAK-STAT binding receptor and receptors that regulate transcription factors, dose response relationship, therapeutic index, combined effects of drugs and factors modifying drug action. b. Adverse drug reactions. c. Drug interactions (pharmacokinetic and pharmacodynamic) d. Drug discovery and clinical evaluation of new drugs -Drug discovery phase, preclinical evaluation phase, clinical trial phase, phases of clinical trials and pharmacovigilance.

### Unit III

Pharmacology of drugs acting on peripheral nervous system a. Organization and function of ANS. b. Neurohumoral transmission, co-transmission and classification of neurotransmitters. c. Parasympathomimetics, Parasympatholytics, Sympathomimetics, sympatholytics. d. Neuromuscular blocking agents and skeletal muscle relaxants (peripheral). e. Local anesthetic agents. f. Drugs used in myasthenia gravis and glaucoma

### Unit IV

Pharmacology of drugs acting on central nervous system a. Neurohumoral transmission in the C.N.S. special emphasis on importance of various neurotransmitters like with GABA, Glutamate, Glycine, serotonin, dopamine. b. General anesthetics and pre-anesthetics. c. Sedatives, hypnotics and centrally acting muscle relaxants. d. Anti-epileptics e. Alcohols and disulfiram

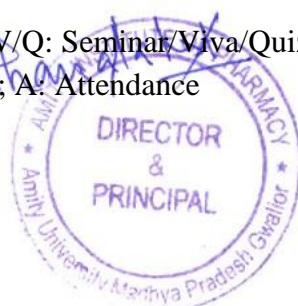
### Unit V

Pharmacology of drugs acting on central nervous system a. Psychopharmacological agents: Antipsychotics, antidepressants, anti-anxiety agents, anti-manics and hallucinogens. b. Drugs used in Parkinsons disease and Alzheimer's disease. c. CNS stimulants and nootropics. d. Opioid analgesics and antagonists e. Drug addiction, drug abuse, tolerance and dependence.

## F. Examination Scheme:

Components	A	CT	S/V/Q/HA	STI	EE
Weightage (%)	4	15	3	3	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination, A: Attendance



### G. Suggested Text/Reference Books:

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchill Livingstone Elsevier
2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill
3. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
4. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs, The Point Lippincott Williams & Wilkins
5. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews- Pharmacology

### H. Lecture Plan



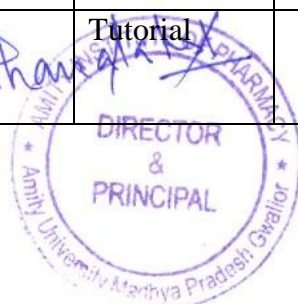
Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction to Pharmacology- Definition, historical landmarks and scope of pharmacology,	Lecture	Unit-1 CO1	Mid Term-1, Quiz & End Sem Exam
2	Nature and source of drugs, essential drugs concept and routes of drug administration,	Lecture	CO1	Mid Term-1, Quiz & End Sem Exam
3	Agonists, antagonists( competitive and non competitive),	Lecture	CO1	Mid Term-1, Quiz & End Sem Exam
4	spare receptors, addiction, tolerance, dependence, tachyphylaxis, idiosyncrasy, allergy.	Tutorial	CO1	Mid Term-1, Quiz & End Sem Exam
5	Pharmacokinetics- Membrane transport, absorption, distribution, metabolism and excretion of drugs .	Lecture	CO1 CO2	Mid Term-1, Quiz & End Sem Exam
6	Pharmacokinetics- Membrane transport, absorption, distribution, metabolism and excretion of drugs	Lecture	CO1 CO2	Mid Term-1, Quiz & End Sem Exam
7	Enzyme induction, enzyme inhibition, kinetics of elimination	Lecture	CO1 CO2	Mid Term-1, Quiz & End Sem Exam
8	Quiz	Tutorial		Mid Term-1, Quiz & End Sem Exam
9	Pharmacodynamics- Principles and mechanisms of drug action.	Lecture	CO1 CO2	Mid Term-1, Quiz & End Sem Exam
10	Receptor theories and classification of receptors, regulation of receptors. drug receptors interactions signal transduction mechanisms	Lecture	CO1 CO2	Mid Term-1, Quiz & End Sem Exam
11	Receptor theories and classification of receptors, regulation of receptors.	Lecture	CO1 CO2	Mid Term-1, Quiz & End Sem Exam
12	Revision	Tutorial		Mid Term-1, Quiz & End Sem Exam
13	transmembrane enzyme linked receptors, transmembrane JAK-STAT binding receptor and receptors that regulate	Lecture	CO1 CO2	Mid Term-1, Quiz & End Sem Exam



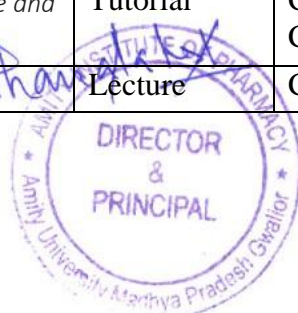
	transcription factors, dose response relationship			
14	therapeutic index, combined effects of drugs and factors modifying drug action.	Lecture	CO1 CO2	Mid Term-1, Quiz & End Sem Exam
15	therapeutic index, combined effects of drugs and factors modifying drug action.	Lecture	CO1 CO2	Mid Term-1, Quiz & End Sem Exam
16	Unit test	Tutorial		Mid Term-1, Quiz & End Sem Exam
17	Adverse drug reactions. c. Drug interactions (pharmacokinetic and pharmacodynamic)	Lecture	CO1 CO3	Mid Term-1, Quiz & End Sem Exam
18	Adverse drug reactions. c. Drug interactions (pharmacokinetic and pharmacodynamic)	Lecture	CO1 CO3	Mid Term-1, Quiz & End Sem Exam
19	Drug discovery and clinical evaluation of new drugs -Drug discovery phase,	Lecture	CO1 CO3	Mid Term-1, Quiz & End Sem Exam
20	preclinical evaluation phase, clinical trial phase, phases of clinical trials and pharmacovigilance.	Tutorial	CO1 CO3	Mid Term-1, Quiz & End Sem Exam
21	Organization and function of ANS. b. Neurohumoral transmission, co-transmission and classification of neurotransmitters.	Lecture	Unit-2 CO3	Mid Term-1, Quiz & End Sem Exam
22	Organization and function of ANS. b. Neurohumoral transmission, co-transmission and classification of neurotransmitters.	Lecture	CO1 CO3	Mid Term-1, Quiz & End Sem Exam
23	. Parasympathomimetics, Parasympatholytics, Sympathomimetics, sympatholytics. d. Neuromuscular blocking agents and skeletal muscle relaxants (peripheral).	Lecture	CO1 CO3	Mid Term-1, Quiz & End Sem Exam
24	Quiz	Tutorial		Mid Term-1, Quiz & End Sem Exam



25	. Parasympathomimetics, Parasympatholytics, Sympathomimetics, sympatholytics. d.	Lecture	CO1 CO3	Mid Term-1, Quiz & End Sem Exam
26	Neuromuscular blocking agents and skeletal muscle relaxants (peripheral).	Lecture	CO1 CO3	Mid Term-1, Quiz & End Sem Exam
27	Neuromuscular blocking agents and skeletal muscle relaxants (peripheral).	Lecture	CO1 CO3	Mid Term-1, Quiz & End Sem Exam
28	Local anesthetic agents. f. Drugs used in myasthenia gravis and glaucoma	Tutorial		Mid Term-1, Quiz & End Sem Exam
29	Local anesthetic agents. f. Drugs used in myasthenia gravis and glaucoma	Lecture	CO1	Mid Term-1, Quiz & End Sem Exam
30	Local anesthetic agents. f. Drugs used in myasthenia gravis and glaucoma	Lecture	CO1 CO3	Mid Term-1, Quiz & End Sem Exam
31	Local anesthetic agents. f. Drugs used in myasthenia gravis and glaucoma	Lecture	CO1 CO3	Mid Term-1, Quiz & End Sem Exam
32	Neurohumoral transmission in the C.N.S.special emphasis on importance of various neurotransmitters like with GABA, Glutamate, Glycine, serotonin, dopamine	Tutorial	Unit-3 CO4	Mid Term-2, Quiz & End Sem Exam
33	Neurohumoral transmission in the C.N.S.special emphasis on importance of various neurotransmitters like with GABA, Glutamate, Glycine, serotonin, dopamine	Lecture	CO1 CO4	Mid Term-2, Quiz & End Sem Exam
34	Neurohumoral transmission in the C.N.S.special emphasis on importance of various neurotransmitters like with GABA, Glutamate, Glycine, serotonin, dopamine	Lecture	CO1 CO4	Mid Term-2, Quiz & End Sem Exam
35	General anesthetics and pre-anesthetics. c. Sedatives, hypnotics and centrally acting muscle relaxants.	Lecture	CO1 CO4	Mid Term-2, Quiz & End Sem Exam
36	Seminar	Tutorial		Mid Term-2, Quiz & End Sem Exam



37	General anesthetics and pre-anesthetics. c. Sedatives, hypnotics and centrally acting muscle relaxants.	Lecture	CO1 CO4	Mid Term-2, Quiz & End Sem Exam
38	General anesthetics and pre-anesthetics. c. Sedatives, hypnotics and centrally acting muscle relaxants.	Lecture	CO1 CO4	Mid Term-2, Quiz & End Sem Exam
39	Anti-epileptics e. Alcohols and disulfiram	Lecture	CO1 CO4	Mid Term-2, Quiz & End Sem Exam
40	Unit test	Tutorial		Mid Term-2, Quiz & End Sem Exam
41	Anti-epileptics e. Alcohols and disulfiram	Lecture	Unit-4	Mid Term-2, Quiz & End Sem Exam
42	Psychopharmacological agents: Antipsychotics, antidepressants,	Lecture	CO1 CO4	Mid Term-2, Quiz & End Sem Exam
43	Psychopharmacological agents: Antipsychotics, antidepressants,	Lecture	CO1	Mid Term-2, Quiz & End Sem Exam
44	Seminar	Tutorial		Mid Term-2, Quiz & End Sem Exam
45	anti-anxiety agents, anti-manics and hallucinogens.	Lecture	CO1 CO4	Mid Term-2, Quiz & End Sem Exam
46	anti-anxiety agents, anti-manics and hallucinogens.	Lecture	CO1 CO4	Mid Term-2, Quiz & End Sem Exam
47	anti-anxiety agents, anti-manics and hallucinogens.	Lecture	CO1	Quiz & End Sem Exam
48	anti-anxiety agents, anti-manics and hallucinogens.	Tutorial		Quiz & End Sem Exam
49	Drugs used in Parkinsons disease and Alzheimer's disease.	Lecture	Unit-5	Quiz & End Sem Exam
50	Drugs used in Parkinsons disease and Alzheimer's disease.	Lecture	CO1 CO5	Quiz & End Sem Exam
51	<i>Drugs used in Parkinsons disease and Alzheimer's disease.</i>	Lecture	CO1 CO5	Quiz & End Sem Exam
52	<i>Drugs used in Parkinsons disease and Alzheimer's disease.</i>	Tutorial	CO1 CO5	Quiz & End Sem Exam
53	<i>CNS stimulants and nootropics.</i>	Lecture	CO1	Quiz & End Sem



			CO5	Exam
54	CNS stimulants and nootropics.	Lecture	CO1 CO5	Quiz & End Sem Exam
55	Opioid analgesics and antagonists	Lecture	CO1 CO5	Quiz & End Sem Exam
56	Unit test	Tutorial		Quiz & End Sem Exam
57	Opioid analgesics and antagonists	Lecture	CO1 CO5	Quiz & End Sem Exam
58	Drug addiction, drug abuse, tolerance and dependence	Lecture	CO1 CO5	Quiz & End Sem Exam
59	Drug addiction, drug abuse, tolerance and dependence	Lecture	CO1 CO5	Quiz & End Sem Exam
60	Unit test	Tutorial		Quiz & End Sem Exam

### I. Course Articulation Matrix (Mapping of COs with POs)

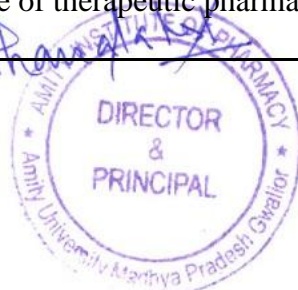
CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 1	PO 2	PO 3
<b>BP404T.1</b>	Understand the pharmacological actions of different categories of drugs	3	-	-	-	2	2	1	-	-	-	-		3	2	1
<b>BP404T.2</b>	Explain the mechanism of drug action at organ system/sub cellular/macromolecular levels.	3	-	-	1	-	2	-	-	-	-	3		2	3	1
<b>BP404T.3</b>	Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.	3	2	-	3	-	2	-	-	-	-	3		1	2	3



<b>BP404T.4</b>	Observe the effect of drugs on animals by simulated experiments	2	2	3	3	-	1	-	-	-	-	3		2	3	2
<b>BP404T.5</b>	Appreciate correlation of pharmacology with other bio medical science	3	-	2	-	2	-	-	-	-	-	3		2	3	3

### Sample Question Paper

Amity Institute of Pharmacy Department of Pharmacology I MID-SEMESTER (SEM –Ist) 2023-24						
Class: B.Pharm, IV Semester						
Subject Name: BP201T Human Anatomy and Physiology-II Theory		Time: 1 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,2,4,10	Q.8,9,6	Q.5,3	Q.7		
Student will be able to <b>CO1.</b> Understand the pharmacological actions of different categories of drugs. Explain the mechanism of drug action at organ system/sub cellular/ macromolecular levels <b>CO2.</b> Apply the basic pharmacological knowledge in the prevention and treatment of various diseases. <b>CO3.</b> Observe the effect of drugs on animals by simulated experiments 5. Appreciate correlation of pharmacology with other bio medical sciences						
CO Map	Question No.	Question				Marks
CO1	Q.1	What is drug addiction, tolerance and dependence.				2
CO1	Q.2	Define membrane transport.				2
CO1	Q.3	Make use of therapeutic pharmacology.				2





CO2	Q.4	Define metabolism of drugs.	2
CO2 CO3	Q.5	What is drug therapeutic window.	2
	Q.6	Explain co- transmission with all neurotransmitters.	10
CO2	Q.7	Write about G protein coupled receptors and factors modifying drug action.	10
CO2	Q.8	Give description about clinical trials of new drugs	5
CO3	Q.9	Give the drugs used in myasthenia gravis and glaucoma	5
CO1 CO2	Q.10	What is side effects and secondary toxic effects.	5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**No Attainment Level:**

51.5 % Percentage of students secured more than 60% marks, so this course PHARMACOLOGY I – THEORY (BP404T) not attained any Level.



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AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACOGNOSY

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

#### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### Programme Outcomes:

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.



**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

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**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

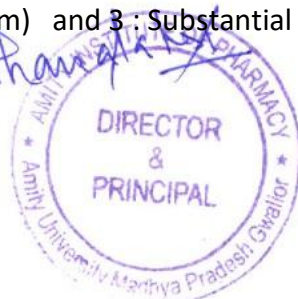
**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3: Substantial (High)

If there is no correlation, put "0"



**PROGRAMME ARTICULATION  
MATRIX**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
IV SEM																	
	BP 405T	3	1	1	1	3	6	7	8	9	3	2		-	2	-	
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*A. H. H. H.*  




# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

<b>DEPARTMENT OF PHARMACOGNOSY</b>
<b>Course Handout</b>
Course : Pharmacognosy and Phytochemistry–I THEORY
Course Code : BP 405T Crédits : 04, Session : 2023-24 (Odd Sem.), Class : B.Pharm. 2nd Year
Faculty Name: Mr. Jamal Basha Dudekula

**A. Introduction:** The subject involves the fundamentals of Pharmacognosy like scope, classification of crude drugs, their identification and evaluation, phytochemicals present in them and their medicinal properties.

**Course Outcomes:** At the end of the course, students will be able to:

**BP405T.1.** To know the Application of Pharmacognosy Principles

**BP405T.2.** To know the techniques in the cultivation and production of crude drugs

**BP405T.3.** To know the crude drugs, their uses and chemical nature

**BP405T.4.** To know the evaluation techniques for the herbal drugs

**BP405T.5.** To carry out the microscopic and morphological evaluation of crude drugs

**B. Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.



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**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**C. Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	3%
	Student – Teacher interaction	S-T I	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>



## D. Syllabus

### UNIT – I

#### Introduction to Pharmacognosy:

- (a) Definition, history, scope and development of Pharmacognosy
- (b) Sources of Drugs – Plants, Animals, Marine & Tissue culture
- (c) Organized drugs, unorganized drugs (dried latex, dried juices, dried extracts, gums and mucilages, oleoresins and oleo- gum -resins).

#### Classification of drugs:

Alphabetical, morphological, taxonomical, chemical, pharmacological, chemo and sero taxonomical classification of drugs

#### Quality control of Drugs of Natural Origin:

Adulteration of drugs of natural origin. Evaluation by organoleptic, microscopic, physical, chemical and biological methods and properties.

Quantitative microscopy of crude drugs including lycopodium spore method, leaf constants, camera lucida and diagrams of microscopic objects to scale with camera lucida.

### UNIT – II

Cultivation, Collection, Processing and storage of drugs of natural origin:

Cultivation and Collection of drugs of natural origin

Factors influencing cultivation of medicinal plants.

Plant hormones and their applications.

Polyploidy, mutation and hybridization with reference to medicinal plants

Conservation of medicinal plants

### UNIT – III

Plant tissue culture:

Historical development of plant tissue culture, types of cultures, Nutritional requirements, growth and their maintenance.

Applications of plant tissue culture in pharmacognosy.

Edible vaccines

### UNIT – IV

Pharmacognosy in various systems of medicine:

Role of Pharmacognosy in allopathy and traditional systems of medicine namely, Ayurveda, Unani, Siddha, Homeopathy and Chinese systems of medicine.

Introduction to secondary metabolites:

Definition, classification, properties and test for identification of Alkaloids, Glycosides, Flavonoids, Tannins, Volatile oil and Resins

### UNIT – V

Study of biological source, chemical nature and uses of drugs of natural origin containing following drugs

Plant Products:

**Fibers** - Cotton, Jute, Hemp

Hallucinogens, Teratogens, Natural allergens

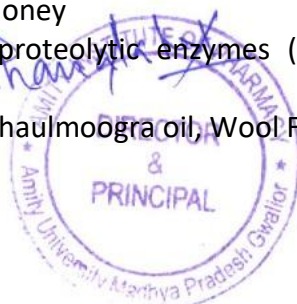
#### Primary metabolites:

General introduction, detailed study with respect to chemistry, sources, preparation, evaluation, preservation, storage, therapeutic used and commercial utility as Pharmaceutical Aids and/or Medicines for the following Primary metabolites:

**Carbohydrates:** Acacia, Agar, Tragacanth, Honey

**Proteins and Enzymes:** Gelatin, casein, proteolytic enzymes (Papain, bromelain, serratiopeptidase, urokinase, streptokinase, pepsin).

**Lipids(Waxes, fats, fixed oils) :** Castor oil, Chaulmoogra oil, Wool Fat, Bees Wax





## Marine Drugs:

Novel medicinal agents from marine sources

### E. Examination Scheme:

Components	A	CT	S/V/Q/HA	STI	EE
Weightage (%)	4	15	3	3	75

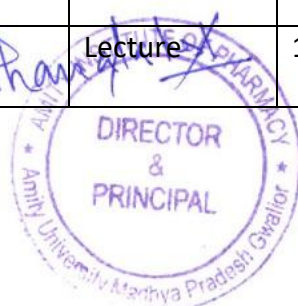
CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination; A: Attendance

### F. Suggested Text/Reference Books:

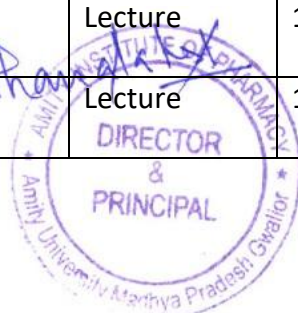
1. W.C.Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Saunders & Co., London, 2009.
2. Tyler, V.E., Brady, L.R. and Robbers, J.E., Pharmacognosy, 9th Edn., Lea and Febiger, Philadelphia, 1988.
3. Text Book of Pharmacognosy by T.E. Wallis
4. Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers & Distribution, New Delhi.
5. Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi.
6. Herbal drug industry by R.D. Choudhary (1996), 1st Edn, Eastern Publisher, New Delhi.
7. Essentials of Pharmacognosy, Dr.SH.Ansari, 11nd edition, Birla publications, New Delhi, 2007
8. Practical Pharmacognosy: C.K. Kokate, Purohit, Gokhlae
9. Anatomy of Crude Drugs by M.A. Iyengar

### G. Lecture Plan

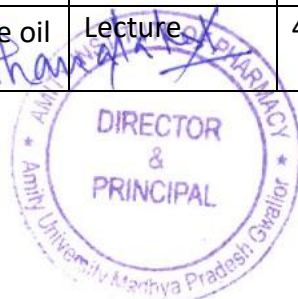
Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Definition, history	Lecture	1,5	Mid Term-1, Quiz & End Sem Exam
2	scope and development of Pharmacognosy	Lecture	1,5	Mid Term-1, Quiz & End Sem Exam
3	Sources of Drugs – Plants, Animals	Lecture	1,5	Mid Term-1, Quiz & End Sem Exam
4	Quiz	Tutorial		Mid Term-1, Quiz & End Sem Exam
5	Marine & Tissue culture	Lecture	1,5	Mid Term-1, Quiz & End Sem Exam
6	Organized drugs, unorganized drugs	Lecture	1,5	Mid Term-1, Quiz & End Sem Exam
7	dried latex, dried juices, dried extracts	Lecture	1,5	Mid Term-1, Quiz & End Sem Exam
8	Quiz	Tutorial		Mid Term-1, Quiz & End Sem Exam
9	Gums and mucilages, oleoresins and oleo- gum -resins).	Lecture	1,5	Mid Term-1, Quiz & End Sem Exam
10	<b>Classification of drugs</b>	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam



11	Alphabetical, morphological,	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
12	Seminar	Tutorial		Mid Term-1, Quiz & End Sem Exam
13	taxonomical, chemical, pharmacological	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
14	chemo and sero taxonomical classification of drugs	Lecture	1,5	Mid Term-1, Quiz & End Sem Exam
15	Quality control of Drugs of Natural Origin:	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
16	Unit test	Tutorial		Mid Term-1, Quiz & End Sem Exam
17	Adulteration of drugs of natural origin	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
18	Evaluation by organoleptic, microscopic, physical	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
19	chemical and biological methods and properties	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
20	Quantitative microscopy of crude drugs	Tutorial		Mid Term-1, Quiz & End Sem Exam
21	lycopodium spore method	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
22	leaf constants, camera lucida	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
23	diagrams of microscopic objects to scale with camera lucida	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
24	Quiz	Tutorial		Mid Term-1, Quiz & End Sem Exam
25	Cultivation, Collection, Processing and storage of drugs of natural origin	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
26	Factors influencing cultivation of medicinal plants	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
27	Plant hormones and their applications.	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
28	Unit Test	Tutorial		Mid Term-1, Quiz & End Sem Exam
29	Polyploidy, mutation and hybridization with reference to medicinal plants	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
30	Conservation of medicinal plants	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
31	Plant tissue culture	Lecture	1,3	Mid Term-2, Quiz & End Sem Exam



32	Historical development of plant tissue culture	Tutorial		Mid Term-2, Quiz & End Sem Exam
33	types of cultures	Lecture	1,3	Mid Term-2, Quiz & End Sem Exam
34	Nutritional requirements	Lecture	1,3	Mid Term-2, Quiz & End Sem Exam
35	growth and maintenance cell cultures	Lecture	3	Mid Term-2, Quiz & End Sem Exam
36	Seminar	Tutorial		Mid Term-2, Quiz & End Sem Exam
37	Applications of plant tissue culture in pharmacognosy	Lecture	1,3	Mid Term-2, Quiz & End Sem Exam
38	Edible vaccines	Lecture	1,3	Mid Term-2, Quiz & End Sem Exam
39	Pharmacognosy in various systems of medicine	Lecture	1,3	Mid Term-2, Quiz & End Sem Exam
40	Unit test	Tutorial		Mid Term-2, Quiz & End Sem Exam
41	Role of Pharmacognosy in allopathy	Lecture	1,5	Mid Term-2, Quiz & End Sem Exam
42	Ayurveda	Lecture	1,5	Mid Term-2, Quiz & End Sem Exam
43	Unani	Lecture	1,3	Mid Term-2, Quiz & End Sem Exam
44	Seminar	Tutorial		Mid Term-2, Quiz & End Sem Exam
45	Siddha	Lecture	1,4	Mid Term-2, Quiz & End Sem Exam
46	Homeopathy	Lecture	2,4	Mid Term-2, Quiz & End Sem Exam
47	Chinese systems of medicine	Lecture	1,2,4	Quiz & End Sem Exam
48	Quiz	Tutorial		Quiz & End Sem Exam
49	Introduction to secondary metabolites	Lecture	1,2,4	Quiz & End Sem Exam
50	Definition	Lecture	1,2,4	Quiz & End Sem Exam
51	Classification, properties and test for identification	Lecture	1,2,4	Quiz & End Sem Exam
52	Group discussion	Tutorial		Quiz & End Sem Exam
53	Alkaloids, Flavonoids,	Lecture	2	Quiz & End Sem Exam
54	Glycosides, Tannins, Volatile oil and Resins	Lecture	4,5	Quiz & End Sem Exam



55	Study of biological source, chemical nature and uses of drugs of natural origin containing following drugs	Lecture	4,5	Quiz & End Sem Exam
56	Unit test	Tutorial		Quiz & End Sem Exam
57	Plant Products: Fibers - Cotton, Jute, Hemp Hallucinogens, Teratogens, Natural allergens	Lecture	2,4,5	Quiz & End Sem Exam
58	Carbohydrates: Acacia, Agar, Tragacanth, Honey Proteins and Enzymes: Gelatin, casein, proteolytic enzymes (Papain, bromelain, serratiopeptidase, urokinase, streptokinase, pepsin).	Lecture	4,5	Quiz & End Sem Exam
59	Lipids (Waxes, fats, fixed oils) : Castor oil, Chaulmoogra oil, Wool Fat, Bees Wax Marine Drugs: Novel medicinal agents from marine sources	Lecture	1,4,5	Quiz & End Sem Exam
60	Unit test	Tutorial		Quiz & End Sem Exam

#### H. Course Articulation Matrix (Mapping of COs with POs)

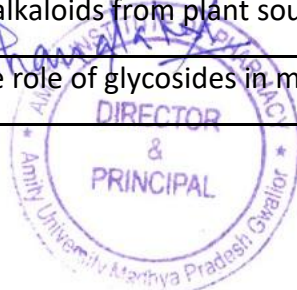
CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES											CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
<b>BP405T.1</b>	To know the Application of Pharmacognosy Principles	3	-	-	2	2	2	-	-	-	-	3		1	2	-
<b>BP405T.2.</b>	To know the techniques in the cultivation and production of crude drugs	3	-	-	2	-	2	-	-	-	-	3		2	1	1



<b>BP405T.3.</b>	To know the crude drugs, their uses and chemical nature	3	2	-	2	-	2	-	-	-	-	3	-	1	1
<b>BP405T.4.</b>	To know the evaluation techniques for the herbal drugs	3	2	-	1	-	1	-	2	2	-	3	-	1	-
<b>BP405T.5.</b>	To carry out the microscopic and morphological evaluation of crude drugs	3	-	-	2	-	-	-	-	-	-	3	-	2	-

### Sample Question Paper

Amity Institute of Pharmacy Department of Pharmacognosy I MID-SEMESTER (SEM –4 <sup>th</sup> ) 2023-24						
Class: B.Pharm, 5thSemester						
Subject Name: BP405 T Pharmacognosy & Phytochemistry I		Time: 1 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,3,4,5	Q.6,8,9	Q.2	Q.7, 10		
The student will be able to						
<b>CO1:</b> To know the Application of Pharmacognosy Principles						
<b>CO2:</b> To know the techniques in the cultivation and production of crude drugs						
<b>CO3:</b> To know the crude drugs, their uses and chemical nature						
<b>CO4:</b> To know the evaluation techniques for the herbal drugs						
<b>CO5:</b> To carry out the microscopic and morphological evaluation of crude drugs						
<b>CO Map</b>	<b>Question No.</b>	<b>Question</b>				<b>Marks</b>
CO4	Q.1	Define Pharmacognosy and its scope.				2
CO5	Q.2	Classify plant-based drugs based on their origin and chemical constituents.				2
CO1	Q.3	Explain the methods used in the extraction and isolation of alkaloids from plant sources				2
CO2	Q.4	Discuss the role of glycosides in medicinal plants				2



CO3	Q.5	What is the significance of pharmacognostic evaluation in ensuring drug quality?	2
CO1	Q.6	Describe the methods of cultivation and harvesting of medicinal plants.	10
CO4	Q.7	Explain the process of phytochemical screening.	10
CO3	Q.8	Discuss the role of tannins in plant-based medicine.	5
CO2	Q.9	How are chromatographic techniques applied in the study of phytochemistry?	5
CO4	Q.10	Discuss the process and importance of standardization in herbal drugs.	5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**No Attainment Level:**

45.3 % Percentage of students secured more than 60% marks, so this course Pharmacognosy and Phytochemistry–II Theory (BP504T) not attained any Level.



*[Handwritten Signature]*





# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

**Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24**

### **Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

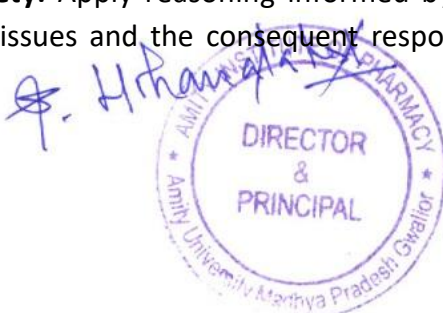
**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.





**[PO.10]. Environment and sustainability:** Understand the impact of professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “-”

PROGRAMME ARTICULATION MATRIX																	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
ISEM	BP108P	3	2	3	1	1	2		3		1	2					
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

*A. H. H. H.*  




## DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

### Course Handout

Course : : Medicinal Chemistry I – (Practical)

Course Code : BP406P, Crédits : 02, Session : 2023-24 (Odd Sem.), Class : B.Pharm. IV Year

Faculty Name: Dr. Dr. Sathish K. Mittapalli

- A. Introduction:** This subject deals with the monographs of inorganic drugs and pharmaceuticals.
- B. Course Outcomes:** At the end of the course, students will be able to:
- BP406P.1.** Preparation of drugs/ intermediates
  - BP406P.2.** Assay of drugs
  - BP406P.3.** Determination of Partition coefficient for any two drugs
  - BP406P.4.** carryout various volumetric and electrochemical titrations.
  - BP406P.5.** develop analytical skills.
- C. Programme Outcomes:**
- [PO.1].Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
- [PO.2].Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
- [PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
- [PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
- [PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.
- [PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).
- [PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values,



communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

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**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### D. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	10%
	Mid Term 2		
	Lab record	LR	1%
	Viva	V	2%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the EndSemester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	2%
End Semester Examination	End Semester Examination	EE	35%
<b>Total</b>			<b>50%</b>

#### E. Syllabus;

##### I Preparation of drugs/ intermediates

- 1 1,3-pyrazole
- 2 1,3-oxazole
- 3 Benzimidazole
- 4 Benztriazole
- 5 2,3- diphenyl quinoxaline
- 6 Benzocaine
- 7 Phenytoin
- 8 Phenothiazine



9 Barbiturate

## II Assay of drugs

1 Chlorpromazine

2 Phenobarbito

3 Atropine

4 Ibuprofen

5 Aspirin

6 Furosemide

### Examination Scheme:

Components	A	CT	LR	V	EE
Weightage (%)	2	10	1	2	35

CT: Class Test, LR: Lab Record, V: Viva, EE: End Semester Examination; A: Attendance

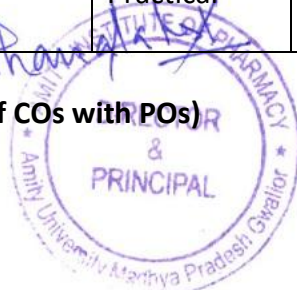
### A. Suggested Text/Reference Books:

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
2. Foye's Principles of Medicinal Chemistry.
3. Burger's Medicinal Chemistry, Vol I to IV.
4. Introduction to principles of drug design- Smith and Williams.
5. Remington's Pharmaceutical Sciences.
6. Martindale's extra pharmacopoeia

### Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Preparation of 1,3-pyrazole	Practical	CO1, 2, 4	Mid Term-1, Quiz & End Sem Exam
2	Preparation of 1,3-oxazole	Practical	CO1, 2, 4	Mid Term-1, Quiz & End Sem Exam
3	Preparation of 1,3-oxazole	Practical	CO1, 2, 4	Mid Term-1, Quiz & End Sem Exam
4	<i>Preparation of Benzotriazole</i>	Practical	CO1,3, 4,	Mid Term-1, Quiz & End Sem Exam
5	Preparation of 2,3-diphenyl quinoxaline	Practical	CO1, 3, 4,	Mid Term-1, Quiz & End Sem Exam
6	Preparation of Benzocaine	Practical	CO1,3, 4,	Mid Term-1, Quiz & End Sem Exam
7	Preparation of Phenytoin	Practical	CO1, 4,5,	Mid Term-2, Quiz & End Sem Exam
8	Preparation of Phenothiazine	Practical	CO1, 4,5,	Mid Term-2, Quiz & End Sem Exam
9	Preparation of Barbiturate	Practical	CO1, 4,5,	Mid Term-2, Quiz & End Sem Exam
10	Assay of Ibuprofen	Practical	CO1, 4,5,	Mid Term-2, Quiz & End Sem Exam
11	Assay of Aspirin	Practical	CO1,4,5,	Mid Term-2, Quiz & End Sem Exam
12	Assay of Furosemide	Practical	CO1, 4,5,	Mid Term-2, Quiz & End Sem Exam

### B. Course Articulation Matrix (Mapping of COs with POs)



CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES										
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11
BP406P.1	Preparation of Phenytoin	2	-	2	1	2	1	-	2	1	2	1
BP406P.2.	Preparation of Benzimidazole	2	-	-	1	-	1	-	-	-	-	3
BP406P.3.	Preparation of 2,3- diphenyl quinoxaline	2	2	2	1	-	2	-	2	-	-	3
BP406P.4.	Assay of Chlorpromazine	2	2	2	1	-	2	-	2	-	-	3
BP406P.5.	Determination of Partition coefficient for any two drugs	1	2	3	-	-	2	-	2	-	-	3

**Sample Question Paper**

<b>Amity Institute of Pharmacy</b> <b>Department of pharmaceutical chemistry</b> <b>I MID-SEMESTER(SEM-IV) 2023-24</b>						
Class: B.Pharm, IV Semester						
Subject Name: BP108P- <b>MEDICINAL CHEMISTRY</b> - I -Practical		Time: 4Hrs			Max.Marks: 40	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4,5	Q.4	Q.2,3,5	Q.2,3,5		
Student will be able to						



**CO.1.** Preparation of drugs/ intermediates  
**CO.2.** To Perform identification tests as per Indian Pharmacopoeia.  
**CO.3.** Assay of drug  
**CO.4.** Understand the medicinal and pharmaceutical importance of medicinal compounds  
**CO.5.** Determination of Partition coefficient for any two drugs

COMap	Question No.	Question	Marks
CO1,2,4	Q.1a	Synopsis-Assay of Chlorpromazine	2
CO1,2,4	Q.1b	Synopsis-Assay of Furosemide	2
CO1,2,4	Q.1c	Determination of Partition coefficient for any two drugs	2
CO 3, 5	Q.1d	Preparation of Phenytoin	2
CO 3, 5	Q.1e	Synopsis- write the molecular formula and uses of Phenothiazine	2
CO1,2, 4,5	Q.2	Experiment To perform the synthesis of Benzotriazole.	25
CO1,2,3,4,5	Q.3	Viva	5

Attainments		Rubric
Level	1	If 60% of students secure more than 60% marks then level 1
Level	2	If 70% of students secure more than 60% marks then level 2
Level	3	If 80% of students secure more than 60% marks then level 3

*F. H. H. H.*  


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## DEPARTMENT OF PHARMACEUTICS

### Course Handout

Course : PHYSICAL PHARMACEUTICS II PRACTICAL

Course Code : BP407P, Programme : B. Pharmacy IV-Semester

Crédits : 02, Session :2023-24 (Even Sem.)

Faculty Name : Ms. Ankita Kishore

**A. Scope:** The course deals with the various physical and physicochemical properties, and principle involved in dosage forms/formulations. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.

**B. Course Outcome: At the end of each course, the student will be able to:**

C407P.1	To determine the particle size, particle size distribution using sieving method or microscopic method
C407P.2	To understand various physicochemical properties of drug molecules in the designing the dosage forms
C407P.3	To know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations
C407P.4	To Determine the angle of repose and influence of lubricant on angle of repose
C407P.5	To determine of reaction rate constant
C407P.6	To demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.

**C. 1. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

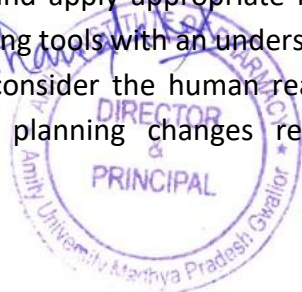
**2. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**3. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice.

Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**4. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**5. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice,





professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well-being.

**6. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**7. Pharmaceutical Ethics:** Honor personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**8. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**9. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional Pharmacy Practice

**10. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**11. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self- assess and use feedback effectively.

**D. Programme specific outcomes:**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

**E. Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous	Mid Term 1	LT	10%



Internal Evaluation			
	Mid Term 2		
	Practical Records/ Regular viva voce	PR/RVV	1% / 2%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	2%
End Semester Examination	End Semester Examination	EE	35%
<b>Total</b>			<b>50%</b>

### F. Syllabus

1. Determination of particle size, particle size distribution using sieving method
2. Determination of particle size, particle size distribution using microscopic method
3. Determination of bulk density, true density and porosity
4. Determine the angle of repose and influence of lubricant on angle of repose
5. Determination of viscosity of liquid using Ostwald's viscometer
6. Determination sedimentation volume with effect of different suspending agent
7. Determination sedimentation volume with effect of different concentration of single suspending agent
8. Determination of viscosity of semisolid by using Brookfield viscometer
9. Determination of reaction rate constant first order.
10. Determination of reaction rate constant second order
11. Accelerated stability studies

### G. Examination Scheme:

Components	A	LT	PR/RVV	EE
Weightage (%)	2	10	1/2	35

LT: Lab Test, PR/RVV: Practical Records/ Regular viva voce, EE: End Semester Examination; A: Attendance

### H. Suggested Text/Reference Books:

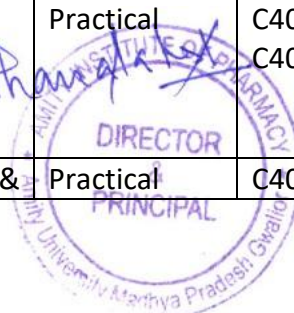
1. Physical Pharmacy by Alfred Martin
2. Experimental Pharmaceutics by Eugene, Parott.
3. Tutorial Pharmacy by Cooper and Gunn.
4. Stocklosam J. Pharmaceutical Calculations, Lea &Febiger, Philadelphia.
5. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, MarcelDekkar Inc.
6. Liberman H.A, Lachman C, Pharmaceutical Dosage forms. Disperse systems, volume 1, 2, 3. Marcel Dekkar Inc.
7. Physical Pharmaceutics by Ramasamy C and ManavalanR.
8. Laboratory Manual of Physical Pharmaceutics, C.V.S. Subramanian, J. Thimma sette



9. Physical Pharmaceutics by C.V.S. Subramanyam

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Determination of particle size, particle size distribution using sieving method	Practical	C407.1	Mid Term-1, PR/RVV & End Sem Exam
2	Determination of particle size, particle size distribution using Microscopic method	Practical	C407.1, C407.6	Mid Term-1, PR/RVV & End Sem Exam
3	Determination of bulk density, true density and porosity	Practical	C407.2	Mid Term-1, PR/RVV & End Sem Exam
4	Determine the angle of repose and influence of lubricant on angle of repose	Practical	C407.4	Mid Term-1, PR/RVV & End Sem Exam
5	Determination of viscosity of liquid using Ostwald's viscometer	Practical	C407.2& C407.3	Mid Term-1, PR/RVV & End Sem Exam
6	Determination sedimentation volume with effect of different suspending agent	Practical	C407.2& C407.3	Mid Term-1, PR/RVV & End Sem Exam
7	Determination sedimentation volume with effect of different concentration of single suspending agent	Practical	C407.2& C407.3	Mid Term-1, PR/RVV & End Sem Exam
8	Determination of viscosity of semisolid by using Brookfield viscometer	Practical	C407.2& C407.3	Mid Term-1, PR/RVV & End Sem Exam
9	Determination of reaction rate constant first order.	Practical	C407.5	Mid Term-2, PR/RVV & End Sem Exam
10	Determination of reaction rate constant second order	Practical	C407.5& C407.3	Mid Term-2, PR/RVV & End Sem Exam
11	To perform Accelerated stability studies	Practical	C407.3& C407.6	Mid Term-2, PR/RVV & End Sem Exam
12	To classify dispersed systems &	Practical	C407.2 &	Mid Term-2,



	their general characteristics, size & shapes of colloidal particles		C407.3	PR/RVV & End Sem Exam
13	To classify of colloids & comparative account of their general properties. Optical, kinetic & electrical properties	Practical	C407.2 & C407.3	Mid Term-2, PR/RVV & End Sem Exam
14	To know Newtonian systems, the law of flow, kinematic viscosity,	Practical	C407.2& C407.3	Mid Term-2, PR/RVV & End Sem Exam
15	To determine rheological properties of emulsions and emulsion formulation by HLB method.	Practical	C407.2& C407.3	Mid Term-2, PR/RVV & End Sem Exam

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Code	Statement	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	PO 11	PSO 1	PSO2	PSO3

I. Course Articulation Matrix (Mapping of COs with POs)



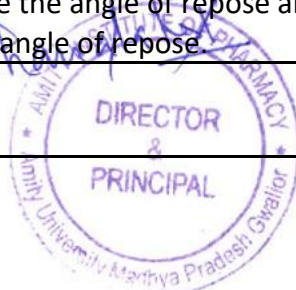
C407.1	To determine the particle size, particle size distribution using sieving method or microscopic method	3	1	2	2	3	2	1	-	-	1	-	3	3	0
C407.2	To understand various physicochemical properties of drug molecules in the designing the dosage forms	1	-	3	1	-	-	1	-	2	1	1	3	3	0
C407.3	To know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations	1	2	-	1	2	-	2	1	-	-	1	3	3	0
C407.4	To Determine the angle of repose and influence of lubricant on angle of repose	2	1	1	1	-	1	2	-	1	-	2	3	2	0
C407.5	To determine of reaction rate constant	1	2	2	-	1	-	1	1	1	2	3	3	2	0
C407.6	To demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.	3	1	1	1	-	1	2	-	1	-	2	3	3	0

  
  
 DIRECTOR & PRINCIPAL

Average		1	1.	1.	1	1.	0	1.	0	0	0.	1.5	2.6	2.6		0
		.	1	5		0	.	3	.	.	6					
		8	6			6			3	8	6					
						6			3							

### Sample Question Paper

Amity Institute of Pharmacy Department of Pharmaceutics I MID-SEMESTER (SEM –IV) 2023-24						
Class: B.Pharm, IV Semester						
Subject Name: BP407P Physical Pharmaceutics-II Practical		Time: 4 Hrs			Max. Marks: 40	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		
Student will be able to						
<b>C407.1</b>	To determine the particle size, particle size distribution using sieving method or microscopic method					
<b>C407.2</b>	To understand various physicochemical properties of drug molecules in the designing the dosage forms					
<b>C407.3</b>	To know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations					
<b>C407.4</b>	To Determine the angle of repose and influence of lubricant on angle of repose					
<b>C407.5</b>	To determine of reaction rate constant					
<b>C407.6</b>	To demonstrate the use of physicochemical properties in the formulation development and evaluation of dosage forms.					
CO Map	Question No.	Question				Marks
C407.3	Q.1a	Synopsis- What is the method to determine accelerated stability studies?				5
C407.1,2,4	Q.1b	Synopsis- explain the various derived properties of powders.				5
C407.1,2, 4,6	Q.2	Experiment To determine the angle of repose and influence of lubricant on angle of repose				25
C407.1,2,3,4,5,6	Q.3	Viva				5



Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**Level 2 Attainment:**

75.58% Percentage of students secured more than 60% marks, so this course Physical Pharmaceutics-II Practical (BP407P) attained Level 2.

*H. H. H. H.*







# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACOLOGY

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### Programme Outcomes:

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.



**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes:**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “-”



**PROGRAMME ARTICULATION  
MATRIX**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
IV SEM	BP408P	3	1	2	-	1	3	2	1	3	2	2	-	-	-	-
	-															
	-															
	-															
	-															
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*H. H. H. H.*



<b>DEPARTMENT OF PHARMACOLOGY</b>
<b>Course Handout</b>
Course : PHARMACOLOGY – I PRACTICAL
Course Code : BP408P, Crédits : 02, Session :2023-24 (IVth SEM), Class : B.Pharm. 2 <sup>nd</sup> Year
Faculty Name: Mr. Arvind Singh Jadon

**A. Introduction:** This course is designed to impart fundamental knowledge on the classification and effects of the drugs on various systems of the human body. It also helps in understanding both pharmacokinetics and pharmacodynamics mechanisms. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.

**B. Course Outcomes:** At the end of the course, students will be able to:

- BP408P.CO1. Introduction to experimental pharmacology.
- BP408P.CO2. Study of different routes of drugs administration in mice/rats.
- BP408P.CO3. Study of effect of hepatic microsomal enzyme inducers on the phenobarbitone sleeping time in mice.
- BP408P.CO4. Effects of skeletal muscle relaxants using rota-rod apparatus.
- BP408P.CO5. Study of stereotype and anti-catatonic activity of drugs on rats/mice.
- BP408P.CO6. Study of local anesthetics by different methods

**Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

*A. H. Jadon*  
  
DIRECTOR & PRINCIPAL  
Amity University Madhya Pradesh Cawaller

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**C. Programme Specific Outcomes:**

PSO 1: Understand the pharmacological actions of different categories of drugs. Explain the mechanism of drug action at organ system/sub-cellular/ macromolecular levels.

PSO 2: Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.

PSO 3: Observe the effect of drugs on animals by simulated experiments

PSO 4: Appreciate the correlation of pharmacology with other bio-medical sciences

**Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	10%
	Mid Term 2		
	Lab record	LR	1%
	Viva	V	2%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves	A	2%



	including medical leaves.		
End Semester Examination	End Semester Examination	EE	35%
<b>Total</b>			<b>50%</b>

#### D. Syllabus

1. Introduction to experimental pharmacology.
2. Commonly used instruments in experimental pharmacology.
3. Study of common laboratory animals.
4. Maintenance of laboratory animals as per CPCSEA guidelines.
5. Common laboratory techniques. Blood withdrawal, serum and plasma separation, anesthetics and euthanasia used for animal studies.
6. Study of different routes of drugs administration in mice/rats.
7. Study of effect of hepatic microsomal enzyme inducers on the phenobarbitone sleeping time in mice.
8. Effect of drugs on ciliary motility of frog oesophagus
9. Effect of drugs on rabbit eye.
10. Effects of skeletal muscle relaxants using rota-rod apparatus.
11. Effect of drugs on locomotor activity using actophotometer.
12. Anticonvulsant effect of drugs by MES and PTZ method.
13. Study of stereotype and anti-catatonic activity of drugs on rats/mice.
14. Study of anxiolytic activity of drugs using rats/mice.
15. Study of local anesthetics by different method

#### Examination Scheme:

Components	A	CT	LR	V	EE
Weightage (%)	2	10	1	2	35

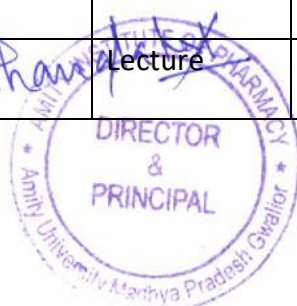
CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination; A: Attendance

#### E. Suggested Text/Reference Books:

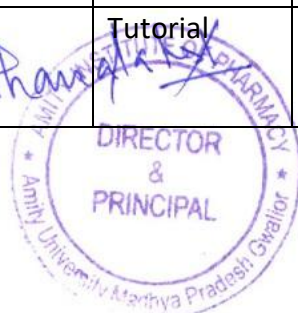
1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchill Livingstone Elsevier
2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill
3. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
4. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs, The Point Lippincott Williams & Wilkins
5. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews- Pharmacology
6. SK Kulkarni.

#### Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction to experimental pharmacology.	Lecture	CO1	Mid Term-1 and 2, Quiz & End Sem Exam
2	Introduction to experimental	Lecture	CO4	Mid Term-1 and 2, Quiz & End



	pharmacology.			Sem Exam
3	Commonly used instruments in experimental pharmacology.	Lecture	CO4	Mid Term-1 and 2, Quiz & End Sem Exam
4	Commonly used instruments in experimental pharmacology.	Tutorial	CO3	Mid Term-1 and 2, Quiz & End Sem Exam
5	Study of common laboratory animals	Lecture	CO3	Mid Term-1 and 2, Quiz & End Sem Exam
6	Maintenance of laboratory animals as per CPCSEA guidelines	Lecture	CO2	Mid Term-1 and 2, Quiz & End Sem Exam
7	Common laboratory techniques. Blood withdrawal, serum and plasma separation, anesthetics and euthanasia used for animal studies.	Lecture	CO5	Mid Term-1 and 2, Quiz & End Sem Exam
8	Study of different routes of drugs administration in mice/rats	Tutorial		Mid Term-1 and 2, Quiz & End Sem Exam
9	Study of effect of hepatic microsomal enzyme inducers on the phenobarbitone sleeping time in mice.	Lecture	CO5	Mid Term-1 and 2, Quiz & End Sem Exam
10	Effect of drugs on ciliary motility of frog oesophagus	Lecture	CO5	Mid Term-1 and 2, Quiz & End Sem Exam
11	Effect of drugs on rabbit	Lecture	CO5	Mid Term-1 and 2, Quiz & End Sem Exam
12	Effects of skeletal muscle relaxants using rota-rod apparatus	Tutorial		Mid Term-1 and 2, Quiz & End Sem Exam
13	Effect of drugs on locomotor activity using actophotometer.	Lecture	CO5	Mid Term-1 and 2, Quiz & End Sem Exam
14	Anticonvulsant effect of drugs by MES and PTZ metho	Lecture	CO5	Mid Term-1 and 2, Quiz & End Sem Exam
15	Study of stereotype and anti-catatonic activity of drugs on rats/mice.	Lecture	CO5	Mid Term-1 and 2, Quiz & End Sem Exam
16	Unit test	Tutorial		Mid Term-1 and 2, Quiz & End Sem Exam



17	Study of anxiolytic activity of drugs using rats/mice.	Lecture	CO6	Mid Term-1 and 2, Quiz & End Sem Exam
18	Study of local anesthetics by different methods	Lecture	CO6	Mid Term-1 and 2, Quiz & End Sem Exam

**F. Course Articulation Matrix (Mapping of COs with POs)**

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
<b>BP408P.1</b>	1 Introduction to experimental pharmacology. 2. Commonly used instruments in experimental pharmacology. 3. Study of common laboratory animals. 4. Maintenance of laboratory animals as per CPCSEA guidelines.	2	-	-	-	1	2	1	-	2	-	-	-	1	-	1

*A. H. H. H.*  



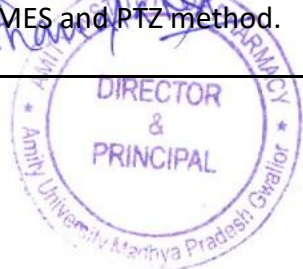

<b>BP408P.2.</b>	Common laboratory techniques. Blood withdrawal, serum and plasma separation, anesthetics and euthanasia used for animal studies. 6. Study of different routes of drugs administration in mice/rats. 7. Study of effect of hepatic microsomal enzyme inducers on the phenobarbitone sleeping time in mice.	3	-	-	1	-	1	-	-	2	-	2	-	2	1	1
<b>BP408P.3.</b>	Effect of drugs on ciliary motility of frog oesophagus 9. Effect of drugs on rabbit eye. 10. Effects of skeletal muscle relaxants using rota-rod apparatus.	3	2	-	3	-	2	-	-	1	-	3	-	1	-	1
<b>BP408P.4.</b>	Effect of drugs on locomotor activity using actophotometer. 12. Anticonvulsant effect of drugs by MES and PTZ method.	2	2	1	3	-	1	-	-	1	-	2	-	-	1	2
<b>BP408P.5.</b>	Study of stereotype and anti-catatonic activity of drugs on	3	-	1	-	2	-	-	-	1	-	2	-	-	-	-



	rats/mice. 14. Study of anxiolytic activity of drugs using rats/mice.																
<b>BP408P.6</b>	Study of local anesthetics by different methods.	3	-	-	1	-	-	-	-	2	-	1	-	-	1	-	

**Sample Question Paper**

Amity Institute of Pharmacy Department of Pharmacology I MID-SEMESTER (SEM –IV) 2023-24						
Class: B.Pharm, IV Semester						
Subject Name: BP408P Pharmacology-I		Time: 4 Hrs			Max. Marks: 40	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,2,	Q.3,4	Q.5,6	Q.7		
Student will be able to CO1. 1. Introduction to experimental pharmacology. 2. Commonly used instruments in experimental pharmacology. 3. Study of common laboratory animals. CO 2 4. Maintenance of laboratory animals as per CPCSEA guidelines. 5. Common laboratory techniques. Blood withdrawal, serum and plasma separation, anesthetics and euthanasia used for animal studies. 6. Study of different routes of drugs administration in mice/rats. CO 3 7. Study of effect of hepatic microsomal enzyme inducers on the phenobarbitone sleeping time in mice. 8. Effect of drugs on ciliary motility of frog oesophagus 9. Effect of drugs on rabbit eye. CO 4 10. Effects of skeletal muscle relaxants using rota-rod apparatus. 11. Effect of drugs on locomotor activity using actophotometer. 12. Anticonvulsant effect of drugs by MES and PTZ method. CO5						



13. Study of stereotype and anti-catatonic activity of drugs on rats/mice.

14. Study of anxiolytic activity of drugs using rats/mice.

CO6

15. Study of local anesthetics by different method

Demonstration of total blood count by cell analyser

Permanent slides of vital organs and gonads

CO Map	Question No.	Question	Marks
CO4	Q.1a	What is CCSEA?	2
CO2	Q.1b	Define Pharmacokinetics.	2
CO2	Q.1c	Make use of animal anesthetics.	2
CO3	Q.1d	What are the different routes of blood withdrawal?	2
CO2	Q.1e	Give the use of rotarod.	2
CO3	Q.2	Experiment: Discuss commonly used instruments in experimental pharmacology.	25
	Q.3	Viva	5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**Attainment Level:**

90.2 % Percentage of students secured more than 60% marks, so this course PHARMACOLOGY I – PRACTICAL (BP408P) attained Level 3.



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AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACOGNOSY

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

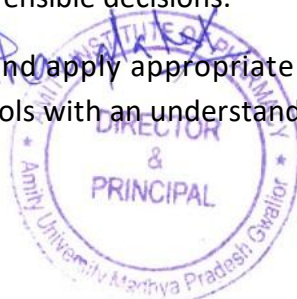
### Programme Outcomes:

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.



**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

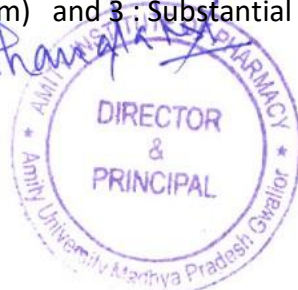
**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3: Substantial (High)

If there is no correlation, put “0”







<b>DEPARTMENT OF PHARMACOLOGY</b>
<b>Course Handout</b>
Course: PHARMACOGNOSY & PHYTOCHEMISTRY I (Practical)
Course Code : BP409 P, Crédits : 02, Session :2023-24 (Odd Sem.), Class : B.Pharm. 2 <sup>nd</sup> Year
Faculty Name : Mr. Jamal Basha Dudekula

A. **Introduction:** This lab-based course enables students to apply theoretical knowledge in real-world scenarios, including identifying plant materials, extracting phytochemicals, and performing qualitative and quantitative analysis. Students gain familiarity with various pharmacognostic, microscopic, and phytochemical techniques essential for the study of plant-based drugs.

B. **Course Outcomes:** At the end of the course, students will be able to:

**BP409P 1.** Understand Identification and Authentication of Medicinal Plants

**BP409P 2.** Understand the importance and implementation of Application of Extraction Techniques

**BP409P 3.** Learn Phytochemical Screening and Analysis

**BP409P 4.** Carried out microscopic and macroscopic analysis.

**BP409P 5.** Understand and Hands-On Use of Chromatographic Techniques

C. **Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

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**D. Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	10%
	Mid Term 2		
	Lab record	LR	1%
	Viva	V	2%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	2%
End Semester Examination	End Semester Examination	EE	35%
<b>Total</b>			<b>50%</b>

**E. Syllabus**

1. Analysis of crude drugs by chemical tests: (i) Tragacanth (ii) Acacia (iii) Agar (iv) Gelatin (v) starch (vi) Honey (vii) Castor oil
2. Determination of stomatal number and index
3. Determination of vein islet number, vein islet termination and palisade ratio.
4. Determination of size of starch grains, calcium oxalate crystals by eye piece micrometer



5. Determination of Fiber length and width
6. Determination of number of starch grains by Lycopodium spore method
7. Determination of Ash value
8. Determination of Extractive values of crude drugs
9. Determination of moisture content of crude drugs
10. Determination of swelling index and foaming

**F. Examination Scheme:**

Components	A	CT	LR	V	EE
Weightage (%)	2	10	1	2	35

CT: Class Test, LR: Lab Record, V: Viva, EE: End Semester Examination; A: Attendance

**G. Suggested Text/Reference Books:**

1. W.C.Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Saunders & Co., London, 2009.
2. Tyler, V.E., Brady, L.R. and Robbers, J.E., Pharmacognosy, 9th Edn., Lea and Febiger, Philadelphia, 1988.
3. Text Book of Pharmacognosy by T.E. Wallis
4. Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers & Distribution, New Delhi.
5. Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi.
6. Herbal drug industry by R.D. Choudhary (1996), 1st Edn, Eastern Publisher, New Delhi.
7. Essentials of Pharmacognosy, Dr.SH.Ansari, 11nd edition, Birla publications, New Delhi, 2007
8. Practical Pharmacognosy: C.K. Kokate, Purohit, Gokhlae
9. Anatomy of Crude Drugs by M.A. Iyengar

**H. Lecture Plan**

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Analysis of crude drugs by chemical tests: (i) Tragacanth	Practical	1, 5	Mid Term-1, Quiz & End Sem Exam
2	(ii) Acacia	Practical	2, 3	Mid Term-1, Quiz & End Sem Exam
3	(iii) Agar	Practical	2, 3	Mid Term-1, Quiz & End Sem Exam
4	(iv) Gelatin	Practical	1	Mid Term-1, Quiz & End Sem Exam
5	v) starch	Practical	4	Mid Term-1, Quiz & End Sem Exam
6	(vi) Honey (vii) Castor oil	Practical	2, 3, 5	Mid Term-1, Quiz & End Sem Exam
7	Determination of stomatal number and index	Practical	1, 4, 5	Mid Term-1, Quiz & End Sem Exam
8	Determination of vein islet number, vein islet termination and palisade ratio.	Practical	1, 5	Mid Term-1, Quiz & End Sem Exam
9	Determination of size of starch grains, calcium oxalate crystals by eye piece micrometer	Practical	4	Mid Term-1, Quiz & End Sem Exam



10	Determination of Fiber length and width	Practical	4	Mid Term-1, Quiz & End Sem Exam
11	Determination of number of starch grains by Lycopodium spore method	Practical	4, 5	Mid Term-1, Quiz & End Sem Exam
12	Determination of Ash value	Practical	1, 4, 5	Mid Term-1, Quiz & End Sem Exam
13	Determination of Extractive values of crude drugs	Practical	1, 4, 5	Mid Term-1, Quiz & End Sem Exam
14	Determination of moisture content of crude drugs	Practical	2, 3	Mid Term-1, Quiz & End Sem Exam
15	Determination of swelling index and foaming	Practical	4, 5	Mid Term-1, Quiz & End Sem Exam

### I. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES											CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
<b>BP409P 1.</b>	Understand Identification and Authentication of Medicinal Plants	3	3	2	3	-	1	3	2	1	2	2		2	2	2
<b>BP409P 2.</b>	Understand the importance and implementation of Application of Extraction Techniques	3	3	2	2	-	1	2	1	-	2	2		1	2	1
<b>BP409P 3.</b>	Learn Phytochemical Screening and Analysis	3	1	1	3	-	-	2	1	-	1	1		1	1	-
<b>BP409P 4.</b>	Carried out microscopic and macroscopic analysis.	3	3	2	3	1	-	2	1	-	2	1		3	3	2



<b>BP409P 5.</b>	Understand and Hands-On Use of Chromatographic Techniques	3	3	2	3	1	-	2	2	1	1	1		2	3	1
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### Sample Question Paper

Amity Institute of Pharmacy Department of Pharmacognosy I MID-SEMESTER (SEM –4 <sup>th</sup> 2023-24)						
Class: B.Pharm, III Semester						
Subject Name: BP 409 P.Pharmacognosy & Phytochemistry I (Practical)		Time: 4 Hrs			Max. Marks: 40	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1b,1e, 1c	Q.1a,1d	Q.2	Q.2,3		
The student will be able to						
<b>CO1.</b> Understand Identification and Authentication of Medicinal Plants						
<b>CO2.</b> Understand the importance and implementation of Application of Extraction Techniques						
<b>CO3.</b> Learn Phytochemical Screening and Analysis						
<b>CO4.</b> Carried out microscopic and macroscopic analysis						
<b>CO.5.</b> Understand and Hands-On Use of Chromatographic Techniques						
<b>CO Map</b>	<b>Question No.</b>	<b>Question</b>				<b>Marks</b>
CO1,2	Q.1a	Describe the steps involved in the microscopic evaluation of a medicinal plant sample.				2
CO1,3	Q.1b	Explain the procedure for performing a qualitative test to detect alkaloids in a plant extract.				2
CO3	Q.1c	How is Thin-Layer Chromatography (TLC) used in the analysis of phytochemicals?				2
CO3	Q.1d	What is the purpose of the macroscopic analysis of plant drugs?				2
CO3,4	Q.1e	Explain the Soxhlet extraction method and its application in phytochemistry.				2
CO3,4,5	Q.2	Experiment Determination of Ash value and Extractive values for the given crude drugs				25
CO1,2,3,4,5	Q.3	Viva				5



Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**Attainment Level: 3**

92.4 % of students secured more than 60% marks, so this course PHARMACOGNOSY & PHYTOCHEISTRY I (Practical) (BP409P) attainment is level 3.



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# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### Programme Outcomes:

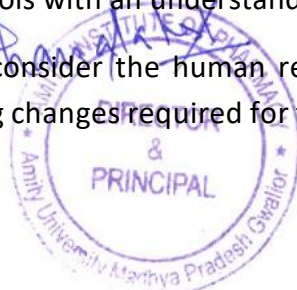
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#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

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**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “-”





**PROGRAMME ARTICULATION  
MATRIX**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
I SEM																	
	BP103T		3	2	2	1	3	2	1	1	3	2					
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*H. H. H. H.*

**AMITY UNIVERSITY PHARMACY**  
 DIRECTOR  
 &  
 PRINCIPAL  
 Amity University, Madhya Pradesh Gwalior



## DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

### Course Handout

Course : Medicinal Chemistry II – THEORY

Course Code : BP501T, Crédits : 04, Session :2023-24 (Odd Sem.), Class : B.Pharm. III Year

Faculty Name: Dr. Sathish K. Mittapalli

- A. Introduction:** The course is designed to impart fundamental knowledge on the preparatory pharmacy with arts and science of preparing the different conventional dosage forms.
- B. Course Outcomes:** At the end of the course, students will be able to:
- BP501T.1.** understand the chemistry of drugs with respect to their pharmacological activity
  - BP501T.2.** *understand the drug metabolic pathways, adverse effect and therapeutic value of drugs*
  - BP501T.3.** know the Structural Activity Relationship (SAR) of different class of drugs
  - BP501T.4.** develop analytical skills.
  - BP501T.5.** write the chemical synthesis of some drugs.
- C. Programme Outcomes:**
- [PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
- [PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
- [PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
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**D. Assessment Plan:**

<b>Component of Evaluation</b>	<b>Description</b>	<b>Code</b>	<b>Weightage %</b>
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	3%
	Student – Teacher interaction	S-T I	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

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## E. Syllabus

### UNIT – I

Doxylamines succinate, Clemastine fumarate, Diphenylphthaline hydrochloride, Tripelenamine hydrochloride, Chlorcyclizine hydrochloride, Meclizine hydrochloride, Buclizine hydrochloride, Chlorpheniramine maleate, Triprolidine hydrochloride\*, Phenidamine tartarate, Promethazine hydrochloride\*, Trimeprazine tartrate, Cyproheptadine hydrochloride, Azatidine maleate, Astemizole, Loratadine, Cetirizine, Levocetrazine Cromolyn sodium.

H<sub>2</sub>-antagonists: Cimetidine\*, Famotidine, Ranitidin.

Gastric Proton pump inhibitors: Omeprazole, Lansoprazole, Rabeprazole,

Pantoprazole Anti-neoplastic agents: Alkylating agents: Meclorothamine\*, Cyclophosphamide, Melphalan Chlorambucil, Busulfan, Thiotepa.

**Antimetabolites:** Mercaptopurine\*, Thioguanine, Fluorouracil, Floxuridine, Cytarabine, Methotrexate\*, Azathioprine

**Antibiotics:** Dactinomycin, Daunorubicin, Doxorubicin, Bleomycin **Plant products:** Etoposide, Vinblastin sulphate, Vincristin sulphate **Miscellaneous:** Cisplatin.

### UNIT – II

Anti-anginal:

Vasodilators: Amyl nitrite, Nitroglycerin, Pentaerythritol tetranitrate, Isosorbide dinitrite\*, Dipyridamole.

Calcium channel blockers: Verapamil, Bepridil hydrochloride, Diltiazem hydrochloride, Nifedipine, Amlodipine, Felodipine, Nicardipine, Nimodipine. Anti-hypertensive Agents: Timolol, Captopril, Lisinopril, Enalapril, Benazepril

hydrochloride, Quinapril hydrochloride, Methyldopate hydrochloride, Clonidine hydrochloride, Guanethidine monosulphate, Guanabenz acetate, Sodium nitroprusside, Diazoxide, Minoxidil, Reserpine, Hydralazine hydrochloride.

### UNIT – III

Anti-arrhythmic Drugs: Quinidine sulphate, Procainamide hydrochloride, Disopyramide phosphate\*, Phenytoin sodium, Lidocaine hydrochloride, Tocainide hydrochloride, Mexiletine hydrochloride, Lorcaïnide hydrochloride, Amiodarone, Sotalol.

Anti-hyperlipidemic agents: Clofibrate, Lovastatin, Cholesteramine and Cholestipol

Coagulant & Anticoagulants: Menadione, Acetomenadione, Warfarin\*, Anisindione, clopidogrel

Drugs used in Congestive Heart Failure: Digoxin, Digitoxin, Nesiritide,

Bosentan, Tezosentan

### UNIT – IV

Drugs acting on Endocrine system Nomenclature, Stereochemistry and metabolism of steroids

Sex hormones: Testosterone, Nandrolone, Progesterones, Oestriol, Oestradiol,

Oestrone, Diethyl stilbestrol. Drugs for erectile dysfunction: Sildenafil, Tadalafil.

Oral contraceptives: Mifepristone, Norgestrel, Levonorgestrol Corticosteroids: Cortisone, Hydrocortisone, Prednisolone, Betamethasone, Dexamethasone

Thyroid and antithyroid drugs: L-Thyroxine, L-Thyronine, Propylthiouracil, Methimazole.

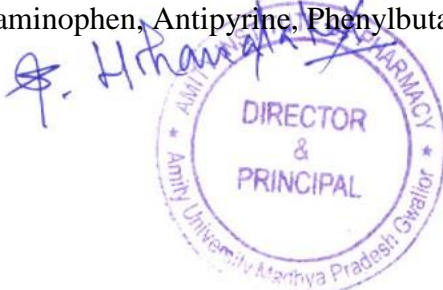
### UNIT – V

#### Antidiabetic agents:

Insulin and its preparations Sulfonyl ureas: Tolbutamide\*, Chlorpropamide, Glipizide, Glimepiride.

Biguanides: Metformin. Narcotic antagonists: Nalorphine hydrochloride, Levallorphan tartarate, Naloxone hydrochloride.

Anti-inflammatory agents: Sodium salicylate, Aspirin, Mefenamic acid\*, Meclofenamate, Indomethacin, Sulindac, Tolmetin, Zomepirac, Diclofenac, Ketorolac, Ibuprofen\*, Naproxen, Piroxicam, Phenacetin, Acetaminophen, Antipyrine, Phenylbutazone.



**Examination Scheme:**

Components	A	CT	S/V/Q/HA	STI	EE
Weightage (%)	4	15	3	3	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination; A: Attendance

**A. Suggested Text/Reference Books:**

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
2. Foye's Principles of Medicinal Chemistry.
3. Burger's Medicinal Chemistry, Vol I to IV.
4. Introduction to principles of drug design- Smith and Williams.
5. Remington's Pharmaceutical Sciences.
6. Martindale's extra pharmacopoeia.
7. Organic Chemistry by I.L. Finar, Vol. II.
8. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1 to 5.
9. Indian Pharmacopoeia.
10. Text book of practical organic chemistry- A.I.Vogel.

**Lecture Plan**

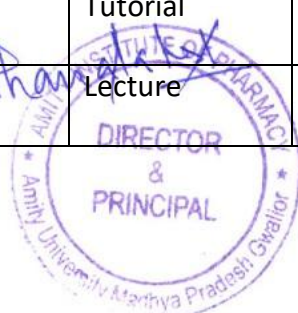
Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	<b>Scope and objectives:</b> This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs. The syllabus also emphasizes on chemical synthesis of important drugs under each class.	Lecture	1,5	Mid Term-1, Quiz & End Sem Exam
2	<b>Antihistaminic agents:</b> Histamine, receptors and their distribution in the human body	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
3	<b>H<sub>1</sub>-antagonists:</b> Diphenhydramine hydrochloride*, Dimenhydrinate, Doxylamines succinate, Clemastine fumarate, Diphenylpyraline hydrochloride	Lecture	1	Mid Term-1, Quiz & End Sem Exam



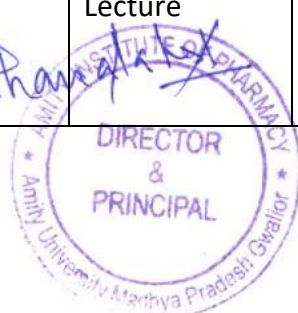
4	<i>Tripelenamine hydrochloride, Chlorcyclizine hydrochloride, Meclizine hydrochloride, Buclizine hydrochloride, Chlorpheniramine maleate, Triprolidine hydrochloride*</i>	Tutorial	1	Mid Term-1, Quiz & End Sem Exam
5	Phenidamine tartarate, Promethazine drochloride*, Trimeprazine tartrate, Cyproheptadine hydrochloride, Azatidine maleate, Astemizole, Loratadine, Cetirizine, Levocetrazine Cromolyn sodium	Lecture	2	Mid Term-1, Quiz & End Sem Exam
6	<b>H<sub>2</sub>-antagonists:</b> Cimetidine*, Famotidine, Ranitidin.	Lecture	1, 2	Mid Term-1, Quiz & End Sem Exam
7	<b>Gastric Proton pump inhibitors:</b> Omeprazole, Lansoprazole, Rabeprazole, Pantoprazole	Lecture	2	Mid Term-1, Quiz & End Sem Exam
8	<b>Anti-neoplastic agents:</b> <b>Alkylating agents:</b> Meclorothamine*, Cyclophosphamide, Melphalan, Chlorambucil, Busulfan, Thiotepa	Tutorial	3	Mid Term-1, Quiz & End Sem Exam
9	<b>H<sub>2</sub>-antagonists:</b> Cimetidine*, Famotidine, Ranitidin.	Lecture	3,4	Mid Term-1, Quiz & End Sem Exam
10	<b>Gastric Proton pump inhibitors:</b> Omeprazole, Lansoprazole, Rabeprazole, Pantoprazole	Lecture	4	Mid Term-1, Quiz & End Sem Exam
11	<b>Anti-neoplastic agents:</b> <b>Alkylating agents:</b> Meclorothamine*, Cyclophosphamide, Melphalan, Chlorambucil, Busulfan, Thiotepa	Lecture	2, 5	Mid Term-1, Quiz & End Sem Exam
12	<b>Antimetabolites:</b> Mercaptopurine*, Thioguanine, Fluorouracil, Floxuridine, Cytarabine, Methotrexate*, Azathioprine	Tutorial	4	Mid Term-1, Quiz & End Sem Exam
13	<b>Antibiotics:</b> Dactinomycin, Daunorubicin, Doxorubicin, Bleomycin	Lecture	5	Mid Term-1, Quiz & End Sem Exam
14	<b>Calcium channelblockers:</b> Verapamil, Bepridilhydrochloride, Diltiazem hydrochloride, Nifedipine,	Lecture	5	Mid Term-1, Quiz & End Sem Exam



	Amlodipine, Felodipine, Nicardipine, Nimodipine.			
15	<b>Anti-hypertensive Agents:</b> Timolol, Captopril, Lisinopril, Enalapril, Benazepril hydrochloride, Quinapril hydrochloride, Methyldopate hydrochloride,* Clonidine hydrochloride, Guanethidine monosulphate, Guanabenz acetate, Sodium nitroprusside, Diazoxide, Minoxidil, Reserpine, Hydralazine hydrochloride.	Lecture	1,5	Mid Term-1, Quiz & End Sem Exam
16	<b>Calcium channelblockers:</b> Verapamil, Bepridilhydrochloride, Diltiazem hydrochloride, Nifedipine, Amlodipine, Felodipine, Nicardipine, Nimodipine.	Tutorial	4	Mid Term-1, Quiz & End Sem Exam
17	<b>Anti-arrhythmic Drugs:</b> Quinidine sulphate, Procainamide hydrochloride, Disopyramide phosphate*, Phenytoin sodium, idocaine hydrochloride, Tocainide hydrochloride, Mexiletine hydrochloride, Lorcainide hydrochloride, Amiodarone, Sotalol.	Lecture	5	Mid Term-1, Quiz & End Sem Exam
18	<b>Anti-hyperlipidemic agents:</b> Clofibrate, Lovastatin, Cholesteramine and Cholestipol	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
19	<b>Anticoagulants:</b> Menadione, Acetomenadione, Warfarin*, Anisindione, clopidogrel	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
20	<b>Drugs acting on Endocrine system</b> Nomenclature, Stereochemistry and metabolism of steroids	Tutorial	3	Mid Term-1, Quiz & End Sem Exam
21	<b>Sex hormones:</b> Testosterone, Nandralone, Progestrones, Oestriol, Oestradiol, Oestrione, Diethyl stilbestrol.	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
22	<b>Drugs for erectile dysfunction:</b> Sildenafil, Tadalafil.	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
23	<b>Oral contraceptives:</b> Mifepristone, Norgestril, Levonorgestrol	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
24	Quiz	Tutorial		Mid Term-1, Quiz & End Sem Exam
25	Cholinergic neurotransmitters:	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam



	Biosynthesis and catabolism of acetylcholine.			
26	Cholinergic receptors (Muscarinic & Nicotinic)	Lecture	Unit-3	Mid Term-1, Quiz & End Sem Exam
27	A Parasympathomimetic agents:	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
28	preparation, procedure, methods of detection	Tutorial	2	Mid Term-1, Quiz & End Sem Exam
29	B SAR of Parasympathomimetic agents	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
30	Direct acting agents: Acetylcholine, Carbachol*, Bethanechol, Methacholine,	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
31	C) Paper chromatography : theory of partition, different techniques employed filter papers,	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
32	Indirect acting/ Cholinesterase inhibitors (Reversible & Irreversible):	Tutorial	2	Mid Term-2, Quiz & End Sem Exam
33	Physostigmine, Neostigmine*, Pyridostigmine,	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
34	Edrophonium chloride, Tacrine hydrochlorid	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
35	Cholinergic Blocking agents: SAR of cholinolytic agents	Lecture	4	Mid Term-2, Quiz & End Sem Exam
36	Seminar	Tutorial		Mid Term-2, Quiz & End Sem Exam
37	Solanaceous alkaloids and analogues: Atropine sulphate	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
38	, Hyoscyamine sulphate, Scopolamine hydrobromide, Homatropine	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
39	hydrobromide, Ipratropium bromide*	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
40	Unit test	Tutorial		Mid Term-2, Quiz & End Sem Exam
41	A) Synthetic cholinergic blocking agents: Tropicamide, Cyclopentolate hydroch	Lecture	4	Mid Term-2, Quiz & End Sem Exam





	loride, Clidinium bromide,			
42	study & working principles of instrumentation	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
43	Dicyclomine hydrochloride*, Glycopyrrolate, Methantheline bromide,	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
44	Seminar	Tutorial		Mid Term-2, Quiz & End Sem Exam
45	Propantheline bromide, Benzotropine mesylate,	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
46	Orphenadrine citrate, Biperidine hydrochloride, Procyclidine hydrochloride*	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
47	applications	Lecture	2,3	Quiz & End Sem Exam
48	Quiz	Tutorial		Quiz & End Sem Exam
49	<i>sedatives and Hypnotics: Benzodiazepines: SAR of Benzodiazepines, Chlordiazepoxide,</i>	Lecture	2,3	Quiz & End Sem Exam
50	<i>Diazepam*, Oxazepam, Chlorazepate, Lorazepam, Alprazolam</i>	Lecture	2,3	Quiz & End Sem Exam
51	<i>applications</i>	Lecture	2,3	Quiz & End Sem Exam
52	<b>Anti-arrhythmic Drugs:</b> Quinidine sulphate, Procainamide hydrochloride, Disopyramide phosphate*, Phenytoin sodium, Lidocaine hydrochloride, Tocainide hydrochloride, Mexiletine hydrochloride, Lorcaïnide hydrochloride, Amiodarone, Sotalol.	Tutorial	2	Quiz & End Sem Exam
53	<b>Anti-hyperlipidemic agents:</b> Clofibrate, Lovastatin, Cholesteramine and Cholestipol	Lecture	2,3	Quiz & End Sem Exam
54	Quiz	Tutorial		Quiz & End Sem Exam
55	<b>Drugs used in Congestive Heart Failure:</b> Digoxin, Digitoxin, Nesiritide, Bosentan, Tezosentan.	Lecture	2,3	Quiz & End Sem Exam



56	<b>Anti-arrhythmic Drugs:</b> Quinidine sulphate, Procainamide hydrochloride, Disopyramide phosphate*, Phenytoin sodium, Lidocaine hydrochloride, Tocainide hydrochloride, Mexiletine hydrochloride, Lorcaïnide hydrochloride, Amiodarone, Sotalol.	Tutorial	2	Quiz & End Sem Exam
57	applications	Lecture	2,3	Quiz & End Sem Exam
58	<b>Thiazolidinediones:</b> Pioglitazone, Rosiglitazone	Lecture	2,3	Quiz & End Sem Exam
59	<b>Meglitinides:</b> Repaglinide, Nateglinide	Lecture	2,3	Quiz & End Sem Exam
60	Piperacetazine hydrochloride, Prochlorperazine maleate, Trifluoperazine hydrochloride.	Tutorial	1,5	Quiz & End Sem Exam
61	<b>Lidocaine/Anilide derivatives:</b> Lignocaine, Mepivacaine, Prilocaine, Etidocaine.	Lecture	2	
62	<b>Miscellaneous:</b> Phenacaine, Dipiperodon, Dibucaine.	Lecture	2	

### B. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
BP501T.1	BP103T.1. understand the chemistry of drugs with respect to their pharmacological activity	3	2	-	-	2	2	1	-	1	-	-				



<b>BP501T.2.</b>	<b>BP103T.2.</b> understand the drug metabolic pathways, adverse effect and therapeutic value of drugs	3	-	-	1	-	2	-	-	-	-	3				
<b>BP501T.3.</b>	<b>BP103T.3.</b> know the Structural Activity Relationship (SAR) of different class of drugs	3	2	-	3	-	2	-	-	-	-	3				
<b>BP501T.4.</b>	<b>BP103T.4.</b> Able to emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs.	2	2	3	3	-	1	-	-	-	-	3				
<b>BP501T.5.</b>	<b>BP103T.5.</b> Emphasizes on chemical synthesis of important drugs under each class.	1	-	3	-	-	-	-	-	-	-	3				

**Sample Question Paper**

Amity Institute of Pharmacy Department of PHARMACEUTICAL CHEMISTRY I MID-SEMESTER (SEM –V ) 2023-24						
Class: B.Pharm, I Semester						
Subject Name: BP103T Pharmaceutics-I Theory		Time: 1 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,3,4,5	Q.6,8,9	Q.2	Q.7, 10		
The student will be able to						



- CO1.** understand the chemistry of drugs with respect to their pharmacological activity  
**CO2.** Understand the principles of volumetric and electro chemical analysis.  
**CO3** understand the drug metabolic pathways, adverse effect and therapeutic value of Drug.  
**CO4.** develop analytical skills.  
**CO5.** Solve the dose calculation, pharmaceutical calculations.

CO Map	Question No.	Question	Marks
CO4	Q.1	Concept of Drug metabolism	2
CO5	Q.2	Different techniques of analysis	2
CO1	Q.3	Anti-hypertensive Agents: Timolol, Captopril, Lisinopril, Enalapril, Benazepril hydrochloride, Quinapril hydrochloride.	2
CO2	Q.4	Drugs acting on Autonomic Nervous System	2
CO2	Q.5	Indirect acting agents: Hydroxyamphetamine, Pseudoephedrine, Propylhexedrine	2
CO1	Q.6	Summarize the different career options available in the pharmaceutical industry.	10
CO4	Q.7	Sympathomimetic agents: SAR of Sympathomimetic agents	10
CO3	Q.8	Theories to know the Structural Activity Relationship (SAR) of different class of drugs	5
CO2	Q.9	physicochemical properties and metabolism of drugs.	5
CO4	Q.10	Drugs acting on Central Nervous System	5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**No Attainment Level:**

54.3 % Percentage of students secured more than 60% marks, so this course MEDICINAL CHEMISTRY-II – THEORY (BP501T) not attained any Level.



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AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICS

**PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) AND  
PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)**

**Bachelor of Pharmacy (B. Pharm.) Academic Year – 2023-24**

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

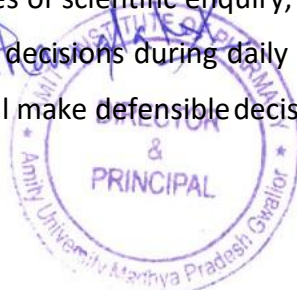
**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

**Programme Outcomes (POs):**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.



**[PO.4].** Modern tool usage: Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team -building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well- being.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self- assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.



**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

PROGRAMME ARTICULATION MATRIX																
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
V SEM	BP505T	3	3	3	3	1	3	1	-	2	2	2		3	3	3

*A. H. H. H.*  
AMITY INSTITUTE OF PHARMACY  
DIRECTOR & PRINCIPAL  
Amity University, Mathura Pradesh Gwalior





## DEPARTMENT OF PHARMACEUTICS

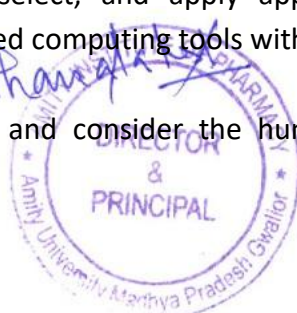
### Course Handout

Course : INDUSTRIAL PHARMACY-I(Theory)

Course Code : BP502T, Crédits : 04, Session :2023-24 (Odd Sem.), Class : B. Pharm. 3rdYear

Faculty Name : Ms. Ankita Kishore

- A. Introduction:** Course enables the student to understand and appreciate the influence of pharmaceutical additives and various pharmaceutical dosage forms on the performance of the drug product. Upon completion of the course, the student shall be able to:
1. Know the various pharmaceutical dosage forms and their manufacturing techniques.
  2. Know various considerations in development of pharmaceutical dosage forms
  3. Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality
- B. Course Outcomes:**At the end of the course, students will be able to:
- BP502T.1** Outline the assessment of physicochemical properties of drugs as a tool in the optimization of solid, liquid oral and parenteral dosage forms and its impact on stability of dosage forms.
- BP502T.2.** Demonstrate tablets, capsules, liquid orals, cosmetics using established procedures and technology.
- BP502T.3.** Examine the facilities and standards necessary for the industrial production of sterile dosage forms and ophthalmic preparations.
- BP502T.4.** Analyze appropriate packaging materials for various pharmaceutical dosage forms.
- BP502T.5** Identify containers, closures, valves and propellants for different types of aerosol systems.
- C. Programme Outcomes:**
- [PO.1]. Pharmacy Knowledge:** Posses knowledge and compression of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
- [PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
- [PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
- [PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
- [PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation



issues, leadership and team -building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well- being.

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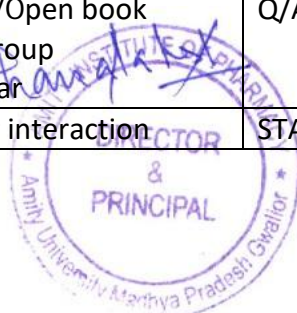
**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10].Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11].Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self- assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**D. Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	A minimum of 80% attendance is required to be maintained by a student to be qualified for taking up the Odd Semester examination	A	4 %
	Quiz/ Assignment/Open book test/Field work/Group discussion/ Seminar	Q/A/OBT/FW/GD/S	3%
	Student – Teacher interaction	STA	3%



End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

Q: Quiz, A: Assignment, OBT: Open book test, FW: Field work, GD: Group discussion, S: Seminar



## E. Syllabus

### Module I: Preformulation Studies:

Introduction to preformulation, goals and objectives, study of physicochemical characteristics of drug substances.

a. Physical properties: Physical form (crystal & amorphous), particle size, shape, flow properties, solubility profile (pKa, pH, partition coefficient), polymorphism

b. Chemical Properties: Hydrolysis, oxidation, reduction, racemisation, polymerization BCS classification of drugs & its significant

Application of preformulation considerations in the development of solid, liquid oral and parenteral dosage forms and its impact on stability of dosage forms.

### Module II: Tablets:

a. Introduction, ideal characteristics of tablets, classification of tablets. Excipients, Formulation of tablets, granulation methods, compression and processing problems. Equipments and tablet tooling.

b. Tablet coating: Types of coating, coating materials, formulation of coating composition, methods of coating, equipment employed and defects in coating.

c. Quality control tests: In process and finished product tests

**Liquid orals:** Formulation and manufacturing consideration of syrups and elixir suspensions and emulsions; Filling and packaging; evaluation of liquid oral official in pharmacopoeia

### Module III: Capsules:

a. **Hard gelatin capsules:** Introduction, Production of hard gelatin capsule shells. Size of capsules, Filling, finishing and special techniques of formulation of hard gelatin capsules, manufacturing defects. In process and final product quality control tests for capsules.

b. **Soft gelatin capsules:** Nature of shell and capsule content, size of capsules, importance of base adsorption and minim/gram factors, production, in process and final product quality control tests. Packing, storage and stability testing of soft gelatin capsules and their applications.

**Pellets:** Introduction, formulation requirements, pelletization process, equipments for manufacture of pellets

### Module IV: Parenteral Products:

a. Definition, types, advantages and limitations. Preformulation factors and essential requirements, vehicles, additives, importance of isotonicity

b. Production procedure, production facilities and controls, aseptic processing

c. Formulation of injections, sterile powders, large volume parenterals and lyophilized products.

d. Containers and closures selection, filling and sealing of ampoules, vials and infusion fluids. Quality control tests of parenteral products.

**Ophthalmic Preparations:** Introduction, formulation considerations; formulation of eyedrops, eye ointments and eye lotions; methods of preparation; labeling, containers; evaluation of ophthalmic preparations

**Module V: Cosmetics:** Formulation and preparation of the following cosmetic preparations: lipsticks, shampoos, cold cream and vanishing cream, tooth pastes, hair dyes and sunscreens.

**Pharmaceutical Aerosols:** Definition, propellants, containers, valves, types of aerosol systems; formulation and manufacture of aerosols; Evaluation of aerosols; Quality control and stability studies.



**Packaging Materials Science:** Materials used for packaging of pharmaceutical products, factors influencing choice of containers, legal and official requirements for containers, stability aspects of packaging materials, quality control tests.

#### F. Examination Scheme:

Components	CT	A	Q/A/OBT/FW/GD/S	STI	EE
Weightage (%)	15	4	3	3	75

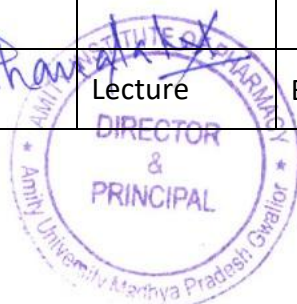
Q: Quiz, A: Assignment, OBT: Open book test, FW: Field work, GD: Group discussion, S: Seminar, STI: Student – Teacher interaction

#### G. Suggested Text/Reference Books:

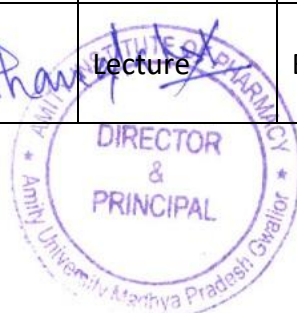
1. Pharmaceutical dosage forms - Tablets, volume 1 -3 by H.A. Liberman, Leon Lachman & J.B. Schwartz
2. Pharmaceutical dosage form - Parenteral medication vol- 1&2 by Liberman & Lachman
3. Pharmaceutical dosage form disperse system VOL-1 by Liberman & Lachman
4. Modern Pharmaceutics by Gilbert S. Banker & C.T. Rhodes, 3rd Edition
5. Remington: The Science and Practice of Pharmacy, 20th edition Pharmaceutical Science (RPS)
6. Theory and Practice of Industrial Pharmacy by Liberman & Lachman
7. Pharmaceutics- The science of dosage form design by M.E. Aulton, Churchill Livingstone, Latest edition
8. Introduction to Pharmaceutical Dosage Forms by H. C. Ansel, Lea & Febiger, Philadelphia, 5th edition, 2005
9. Drug stability - Principles and practice by Cartensen & C.J. Rhodes, 3rd Edition, Marcel Dekker Series, Vol 107.
10. Khar RK. Lachman/Lieberman: the theory and practice of industrial pharmacy. CBS Publishers & Distribution; 2013.

#### H. Lecture Plan

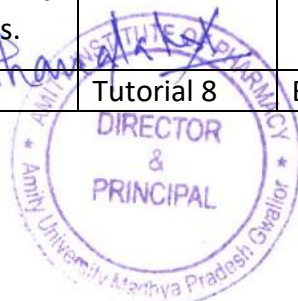
Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1.	Introduction to preformulation, goals and objectives	Lecture	BP502T.1	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
2.	Study of physicochemical characteristics of drug	Lecture	BP502T.1	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
3.	Physical form (crystal & amorphous), particle size, shape	Lecture	BP502T.1	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
4.	Tutorial 1	Tutorial 1	BP502T.1	
5.	Flow properties, solubility profile (pKa, pH, (Maximum 1000 characters allowed)	Lecture	BP502T.1	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
6.	Hydrolysis, oxidation, reduction, racemisation,	Lecture	BP502T.1	Mid Term-1, Quiz/ Assignment/Open



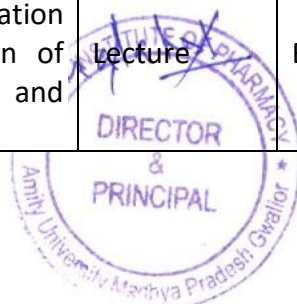
	polymerization			book test/& End Sem Exam
7.	Application of preformulation considerations in the development of solid dosage forms and its impact on stability of dosage forms.	Lecture	BP502T.1	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
8.	Tutorial 2	Tutorial 2		
9.	Application of preformulation considerations in the development of liquid oral dosage forms and its impact on stability of dosage forms.	Lecture	BP502T.1	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
10.	Tablets: Introduction, ideal characteristics of tablets. Classification of tablets.	Lecture	BP502T.1	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
11.	Excipients, Formulation of tablets.	Lecture	BP502T.2	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
12.	Tutorial 3	Tutorial 3	BP502T.2	
13.	Granulation methods, compression and processing problems	Lecture	BP502T.2	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
14.	Equipments and tablet tooling.	Lecture	BP502T.2	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
15.	Tablet coating: Types of coating, coating materials,	Lecture	BP502T.2	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
16.	Tutorial 4	Tutorial 4	BP502T.2	
17.	Formulation of coating composition, methods of coating,	Lecture	BP502T.2	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
18.	Equipment employed in coating and defects in coating.	Lecture	BP502T.2	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
19.	Quality control tests: In process and finished product tests	Lecture	BP502T.2	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam



				Exam
20.	Tutorial 5	Tutorial 5	BP502T.2	
21.	Liquid orals: Formulation and manufacturing consideration of syrups and elixirs. Filling and packaging; evaluation of liquid oralsofficial in pharmacopoeia	Lecture	BP502T.2	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
22.	Formulation and manufacturing consideration of suspensions and emulsions	Lecture	BP502T.2	Mid Term-1, Quiz/ Assignment/Ope n book test/& End Sem Exam
23.	Filling and packaging;	Lecture	BP502T.2	Mid Term-1, Quiz/ Assignment/Ope n book test/& End Sem Exam
24.	Tutorial 6	Tutorial 6	BP502T.2	
25.	Evaluation of liquid orals official in pharmacopoeia	Lecture	BP502T.2	Mid Term-1, Quiz/ Assignment/Ope n book test/& End Sem Exam
26.	Hard gelatin capsules: Introduction, Production of hard gelatin capsule shells. Size of capsules	Lecture	BP502T.3	Mid Term-1, Quiz/ Assignment/Ope n book test/& End Sem Exam
27.	Filling, finishing and special techniques of formulation of hard gelatin capsules, manufacturing defects.	Lecture	BP502T.3	Mid Term-1, Quiz/ Assignment/Ope n book test/& End Sem Exam
28.	Tutorial 7	Tutorial 7	BP502T.2	
29.	In process and final product quality control tests for capsules.	Lecture	BP502T.3	Mid Term-1, Quiz/ Assignment/Ope n book test/& End Sem Exam
30.	Soft gelatin capsules: Nature of shell and capsule content, size of capsules	Lecture	BP502T.3	Mid Term-1, Quiz/ Assignment/Ope n book test/& End Sem Exam
31.	Importance of base adsorption and minim/gram factors. Production, in process and final product quality control tests.	Lecture	BP502T.3	Mid Term-1, Quiz/ Assignment/Ope n book test/& End Sem Exam
32.	Tutorial 8	Tutorial 8	BP502T.3	



33.	Packing, storage of soft gelatin capsules. Stability testing of soft gelatin capsules and their applications.	Lecture	BP502T.3	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
34.	Pellets: Introduction, formulation requirements,	Lecture	BP502T.3	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
35.	Pelletization process, equipments for manufacture of pellets	Lecture	BP502T.3	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
36.	Tutorial 9	Tutorial 9	BP502T.3	
37.	Parenteral Products: a. Definition, types, advantages and limitations.	Lecture	BP502T.3	Mid Term-2, Quiz/ Assignment/Open book test/& End Sem Exam
38.	Preformulation factors and essential requirements, vehicles, additives, importance of isotonicity	Lecture	BP502T.3	Mid Term-2, Quiz/ Assignment/Open book test/& End Sem Exam
39.	b. Production procedure, production facilities and controls, aseptic processing	Lecture	BP502T.4	Mid Term-2, Quiz/ Assignment/Open book test/& End Sem Exam
40.	Tutorial 10	Tutorial 10	BP502T.4	
41.	Formulation of injections, sterile powders, large volume parenterals and lyophilized products.	Lecture	BP502T.4	Mid Term-2, Quiz/ Assignment/Open book test/& End Sem Exam
42.	Formulation of eye drops, and eye ointments methods of preparation	Lecture	BP502T.4	Mid Term-2, Quiz/ Assignment/Open book test/& End Sem Exam
43.	Containers and closures selection, filling and sealing of ampoules, vials and infusion fluids.	Lecture	BP502T.4	Mid Term-2, Quiz/ Assignment/Open book test/& End Sem Exam
44.	Tutorial 11	Tutorial 11	BP502T.4	
45.	Quality control tests of parenteral products.	Lecture	BP502T.4	Mid Term-2, Quiz/ Assignment/Open book test/& End Sem Exam
46.	Ophthalmic Preparations: Introduction, formulation considerations; formulation of eye drops, eye ointments and eye lotions;	Lecture	BP502T.4	Mid Term-2, Quiz/ Assignment/Open book test/& End Sem Exam





47.	Methods of preparation; labeling, containers; evaluation of ophthalmic preparations	Lecture	BP502T.4	Mid Term-2, Quiz/Assignment/Open book test/& End Sem Exam
48.	Tutorial 12	Tutorial 12	BP502T.4	
49.	Cosmetics: Formulation and preparation of the following cosmetic preparations: lipsticks, shampoos,	Lecture	BP502T.5	Mid Term-2, Quiz/Assignment/Open book test/& End Sem Exam
50.	cold cream and vanishing cream, tooth pastes	Lecture	BP502T.5	Mid Term-2, Quiz/Assignment/Open book test/& End Sem Exam
51.	Hair dyes and sunscreens.	Lecture	BP502T.5	Mid Term-2, Quiz/Assignment/Open book test/& End Sem Exam
52.	Tutorial 13	Tutorial 13	BP502T.5	
53.	Pharmaceutical Aerosols: Definition, propellants, containers, valves, types of aerosol systems	Lecture	BP502T.5	Mid Term-2, Quiz/Assignment/Open book test/& End Sem Exam
54.	Formulation and manufacture of aerosols	Lecture	BP502T.5	Mid Term-2, Quiz/Assignment/Open book test/& End Sem Exam
55.	Evaluation of aerosols; Quality control and stability studies.	Lecture	BP502T.5	Mid Term-2, Quiz/Assignment/Open book test/& End Sem Exam
56.	Tutorial 14	Tutorial 14	BP502T.5	
57.	Packaging Materials Science: Materials used for packaging of pharmaceutical products, factors influencing choice of containers	Lecture	BP502T.5	Mid Term-2, Quiz/Assignment/Open book test/& End Sem Exam
58.	Legal and official requirements for containers, stability aspects of packaging materials	Lecture	BP502T.5	Mid Term-2, Quiz/Assignment/Open book test/& End Sem Exam
59.	Quality control tests	Lecture	BP502T.5	Mid Term-2, Quiz/Assignment/Open book test/& End Sem Exam
60.	Tutorial 15	Tutorial 15	BP502T.5	



**I. Course Articulation Matrix (Mapping of COs with POs)**

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
<b>BP502T.1</b>	<i>Outline the assessment of physicochemical properties of drugs as a tool in the optimization of solid, liquid oral and parenteral dosage forms and its impact on stability of dosage forms.</i>	3	1	2	3	1	1	2	1	1	2	2		3	2	3
<b>BP502T.2</b>	<i>Demonstrate tablets, capsules, liquid orals, cosmetics using established procedures and technology.</i>	3	2	3	3	2	3	-	1	1	1	1		3	3	3
<b>BP502T.3</b>	<i>Examine the facilities and standards necessary for the industrial production of sterile dosage forms and ophthalmic preparations.</i>	3	3	3	3	2	2	-	2	2	1	1		3	3	2
<b>BP502T.4</b>	<i>Analyze appropriate packaging materials for various pharmaceutical dosage forms.</i>	3	3	2	3	2	1	-	1	1	-	2		0	3	2

<b>BP502T.5</b>	<i>Identify containers, closures, valves and propellants for different types of aerosol systems.</i>	3	3	2	3	3	2	-	1	-	-	-		3	3	2
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## Sample Question Paper

Amity Institute of Pharmacy Department of Pharmaceutics I MID-SEMESTER (SEM-V) 2023-24						
Class: B. Pharm V Semester						
Subject Name: Industrial Pharmacy I– Theory		Time: 1 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q. 1,3,5	Q. 2,4	Q. 7,8,9		Q. 10	
<p>Student will be able to</p> <p>CO1: Outline the assessment of physicochemical properties of drugs as a tool in the optimization of solid, liquid oral and parenteral dosage forms and its impact on stability of dosage forms.</p> <p>CO2: Demonstrate tablets, capsules, liquid orals, cosmetics using established procedures and technology.</p>						
CO Map	Question No.	Question				Marks
CO1	Q.1	Define preformulation with examples.				2
CO2	Q.2	What are dispersible tablet and effervescent tablet?				2
	Q.3	Define disintegration time and give its limit for different tablet types.				2
CO2	Q.4	What is low-volume parenteral?				2
CO2	Q.5	Define lyophilization.				2
CO1	Q.6	Define the term preformulation and explain the physical properties of preformulations.				10
	Q.7	Explain in detail the evaluation parameters for tablet.				
CO1	Q.8	Explain the BCS classification of drugs & its significant				5
CO2	Q.9	Explain various advantages and disadvantages of capsules.				5
CO2	Q.10	Evaluate the final product quality control tests for capsules.				5

*A. H. H. H.*

AMITY INSTITUTE OF PHARMACY  
DIRECTOR & PRINCIPAL  
Amity University, Mathya Pradesh  
Gwalior

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**Level-1 Attainment:**

61.62% Percentage of students secured more than 60% marks, so this course INDUSTRIAL PHARMACY I– THEORY (BP502T) attained Level-1.

*H. H. H. H.*





AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACOLOGY

## PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) AND PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

**Bachelor of Pharmacy (B. Pharm.) Academic Year – 2023-24**

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### Programme Outcomes (POs):

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.



**[PO.4].** Modern tool usage: Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team -building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well- being.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self- assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.



**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

		PO 1	PO 2	PO 3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PSO 1	PSO 2	PSO 3
V SEM	BP 503T	3	3	3	3	2	2	3	1	1	3	1	-	-	-

*[Handwritten Signature]*  
 AMITY INSTITUTE OF PHARMACY  
 DIRECTOR & PRINCIPAL  
 Amity University, Mathya Pradesh Gwalior





<b>DEPARTMENT OF PHARMACOLOGY</b>
<b>Course Handout</b>
Course : Pharmacology-II (Theory)
Course Code : BP503T, Credits : 04, Session : 2023-24 (Odd Sem.), Class : B. Pharm. 3rd Year
Faculty Name : Dr. Naveen Sharma

**A. Introduction:** This subject is intended to impart the fundamental knowledge on various aspects (classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications) of drugs acting on different systems of body and in addition, emphasis the basic concepts of bioassay.:

1. Know the classification of the drugs
2. Understand the mechanism of action, therapeutic uses, clinical uses and side effects of the drugs
3. Know the importance of bio-assays in preclinical drug discovery
4. Understand the pharmacology of drugs act on CVS, autacoids, coagulation, hormones etc.

**B. Course Outcomes:** At the end of the course, students will be able to:

**BP503T.1.** Discuss the Pharmacology of the drugs affecting the cardiovascular system.

**BP503T.2.** Explain the pharmacology of diuretics and anti-coagulants.

**BP503T.3.** Explain mechanism of actions and pharmacological actions of autacoids.

**BP503T.4.** Explain the pharmacology of the drugs acting on the endocrine system.

**BP503T.5** Describe the various methods and applications of bioassay.

**C. Programme Outcomes:**

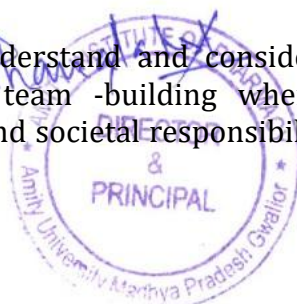
**[PO.1].Pharmacy Knowledge:** Posses knowledge and compression of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team -building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as



responsible citizens or leadership roles when appropriate to facilitate improvement in health and well-being.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

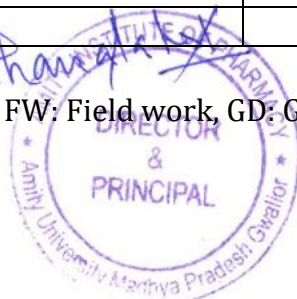
**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### D. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	A minimum of 80% attendance is required to be maintained by a student to be qualified for taking up the Odd Semester examination	A	4 %
	Quiz/ Assignment/Open book test/ Field work/Group discussion/ Seminar	Q/A/OBT/FW/GD/S	3%
	Student - Teacher interaction	STA	3%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

Q: Quiz, A: Assignment, OBT: Open book test, FW: Field work, GD: Group discussion, S: Seminar



## E. Syllabus

### Module I: Pharmacology of drugs acting on cardio vascular system:

a. Introduction to hemodynamic and electrophysiology of heart; b. Drugs used in congestive heart failure; c. Anti-hypertensive drugs; d. Anti-anginal drugs; e. Anti-arrhythmic drugs; f. Anti-hyperlipidemic drugs.

### Module II: Pharmacology of drugs acting on cardio vascular and urinary system:

a. Drug used in the therapy of shock. b. Hematinics, coagulants and anticoagulants. c. Fibrinolytics and anti-platelet drugs d. Plasma volume expanders; a. Diuretics b. Anti-diuretics.

### Module III Autocoids and related drugs:

Autocoids and related drugs a. Introduction to autacoids and classification b. Histamine, 5-HT and their antagonists. c. Prostaglandins, Thromboxanes and Leukotrienes. d. Angiotensin, Bradykinin and Substance P. e. Non-steroidal anti-inflammatory agents f. Anti-gout drugs g. Antirheumatic drugs

### Module IV: Pharmacology of drugs acting on endocrine system:

Pharmacology of drugs acting on endocrine system a. Basic concepts in endocrine pharmacology. b. Anterior Pituitary hormones- analogues and their inhibitors. c. Thyroid hormones- analogues and their inhibitors.

d. Hormones regulating plasma calcium level- Parathormone, Calcitonin and Vitamin-D. d. Insulin, Oral Hypoglycemic agents and glucagon. e. ACTH and corticosteroids

### Module V: Pharmacology of drugs acting on endocrine system and bioassay of drugs:

Pharmacology of drugs acting on endocrine system a. Androgens and Anabolic steroids. b. Estrogens, progesterone and oral contraceptives. c. Drugs acting on the uterus; Bioassay a. Principles and applications of bioassay. b.Types of bioassay c. Bioassay of insulin, oxytocin, vasopressin, ACTH,d-tubocurarine,digitalis, histamine and 5-HT.

## F. Examination Scheme:

Components	CT	A	Q/A/OBT/FW/GD/S	STI	EE
Weightage (%)	15	4	3	3	75

Q: Quiz, A: Assignment, OBT: Open book test, FW: Field work, GD: Group discussion, S: Seminar, STI: Student – Teacher interaction

## G. Suggested Text/Reference Books:

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchill Livingstone Elsevier
2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill.
3. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
4. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs, The Point Lippincott Williams & Wilkins.

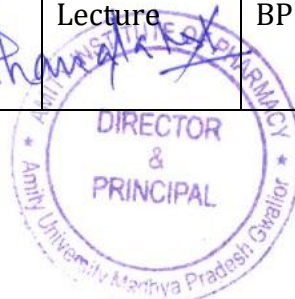


5. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews- Pharmacology.

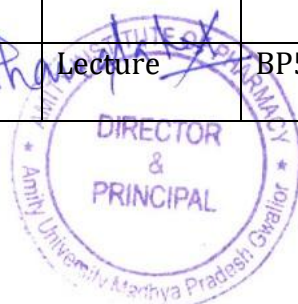
6. K.D.Tripathi. Essentials of Medical Pharmacology, , JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi

### H. Lecture Plan

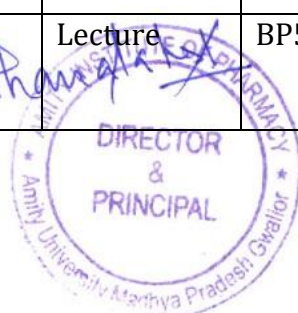
Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1.	Introduction to hemodynamic and electrophysiology of heart	Lecture	BP503T.1	Mid Term-1, Quiz & End Sem Exam
2.	Drugs used in congestive heart failure	Lecture	BP503T.1	Mid Term-1, Quiz & End Sem Exam
3.	Drugs used in congestive heart failure	Lecture	BP503T.1	Mid Term-1, Quiz & End Sem Exam
4.	Tutorial 01	Tutorial 01		
5.	<i>Anti-hypertensive drugs</i>	Lecture	BP503T.1	Mid Term-1, Quiz & End Sem Exam
6.	Anti-anginal drugs	Lecture	BP503T.1	Mid Term-1, Quiz & End Sem Exam
7.	Anti-anginal drugs	Lecture	BP503T.1	Mid Term-1, Quiz & End Sem Exam
8.	Tutorial 02	Tutorial 02		
9.	Anti-arrhythmic drugs	Lecture	BP503T.1	Mid Term-1, Quiz & End Sem Exam
10.	Anti-hyperlipidemic drugs	Lecture	BP503T.1	Mid Term-1, Quiz & End Sem Exam
11.	Anti-hyperlipidemic drugs	Lecture	BP503T.1	Mid Term-1, Quiz & End Sem Exam
12.	Tutorial 03	Tutorial 04		
13.	Hematinics	Lecture	BP503T.2	Mid Term-1, Quiz & End Sem Exam
14.	Drug used in the therapy of shock	Lecture	BP503T.2	Mid Term-1, Quiz & End Sem Exam
15.	Coagulants	Lecture	BP503T.2	Mid Term-1, Quiz & End Sem Exam
16.	Tutorial 04	Tutorial 04		
17.	Anticoagulants	Lecture	BP503T.2	Mid Term-1, Quiz & End Sem Exam



18.	Fibrinolytics	Lecture	BP503T.2	Mid Term-1, Quiz & End Sem Exam
19.	Anti-platelet drugs	Lecture	BP503T.2	Mid Term-1, Quiz & End Sem Exam
20.	Tutorial 05	Tutorial 05		
21.	Plasma volume expanders	Lecture	BP503T.2	Mid Term-1, Quiz & End Sem Exam
22.	Pharmacology of drugs acting on urinary system	Lecture	BP503T.2	Mid Term-1, Quiz & End Sem Exam
23.	Diuretics	Lecture	BP503T.2	Mid Term-1, Quiz & End Sem Exam
24.	Tutorial 06	Tutorial 06		
25.	Anti-diuretic	Lecture	BP503T.2	Mid Term-1, Quiz & End Sem Exam
26.	Introduction to autacoids and classification	Lecture	BP503T.3	Mid Term-1, Quiz & End Sem Exam
27.	Histamine and their antagonists	Lecture	BP503T.3	Mid Term-1, Quiz & End Sem Exam
28.	Tutorial 07	Tutorial 07		
29.	Prostaglandins	Lecture	BP503T.3	Mid Term-1, Quiz & End Sem Exam
30.	Thromboxanes and Leukotrienes.	Lecture	BP503T.3	Mid Term-1, Quiz & End Sem Exam
31.	5-HT and their antagonists	Lecture	BP503T.3	Mid Term-1, Quiz & End Sem Exam
32.	Tutorial 08	Tutorial 08		
33.	Angiotensin, Bradykinin and Substance P	Lecture	BP503T.3	Mid Term-1, Quiz & End Sem Exam
34.	Non-steroidal anti- inflammatory agents	Lecture	BP503T.3	Mid Term-2, Quiz & End Sem Exam
35.	Anti-gout drugs	Lecture	BP503T.3	Mid Term-2, Quiz & End Sem Exam
36.	Tutorial 09	Tutorial 09		
37.	Antirheumatic drugs	Lecture	BP503T.3	Mid Term-2, Quiz & End Sem Exam
38.	Basic concepts in endocrine pharmacology	Lecture	BP503T.4	Mid Term-2, Quiz & End Sem



				Exam
39.	Anterior Pituitary hormones-analogues and their inhibitors	Lecture	BP503T.4	Mid Term-2, Quiz & End Sem Exam
40.	Tutorial 10	Tutorial 10		
41.	Thyroid hormones-analogues and their inhibitors	Lecture	BP503T.4	Mid Term-2, Quiz & End Sem Exam
42.	Hormones regulating plasma calcium level-Parathormone, Calcitonin and Vitamin-D	Lecture	BP503T.4	Mid Term-2, Quiz & End Sem Exam
43.	Insulin, Oral Hypoglycemic agents and glucagon	Lecture	BP503T.4	Mid Term-2, Quiz & End Sem Exam
44.	Tutorial 11	Tutorial 11		
45.	ACTH and corticosteroids	Lecture	BP503T.4	Mid Term-2, Quiz & End Sem Exam
46.	Pharmacology of drugs acting on endocrine system	Lecture	BP503T.4	Mid Term-2, Quiz & End Sem Exam
47.	Androgens and Anabolic	Lecture	BP503T.4	Mid Term-2, Quiz & End Sem Exam
48.	Tutorial 12	Tutorial 12		
49.	Estrogen and steroids	Lecture	BP503T.5	Mid Term-2, Quiz & End Sem Exam
50.	Estrogens and Progesterone	Lecture	BP503T.5	Mid Term-2, Quiz & End Sem Exam
51.	Oral contraceptives and Drugs acting on the uterus	Lecture	BP503T.5	Mid Term-2, Quiz & End Sem Exam
52.	Tutorial 13	Tutorial 13		
53.	Basic concepts in endocrine pharmacology	Lecture	BP503T.5	Mid Term-2, Quiz & End Sem Exam
54.	Anterior Pituitary hormones-analogues and their inhibitors	Lecture	BP503T.5	Mid Term-2, Quiz & End Sem Exam
55.	Principles and applications of Bioassay, Types of bioassay	Lecture	BP503T.5	Mid Term-2, Quiz & End Sem Exam
56.	Tutorial 14	Tutorial 14		
57.	Bioassay of insulin, oxytocin, vasopressin, ACTH	Lecture	BP503T.5	Mid Term-2, Quiz & End Sem Exam
58.	Bioassay of d-tubocurarine, digitalis,	Lecture	BP503T.5	Mid Term-2, Quiz & End Sem Exam




59.	Bioassay of histamine and 5-HT	Lecture	BP503T.5	Mid Term-2, Quiz & End Sem Exam
60.	Tutorial 15	Tutorial 15		Mid Term-2, Quiz & End Sem Exam

### I. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES										
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	
BP503T.1	Discuss the drugs acting on the various disorders of cardiovascular system	2	2	3	2	-	1	2	1	-	-	1
BP503T.2	Discuss the drugs acting on the various disorders of cardiovascular system including diuretics and drugs acts on coagulation and antiplatelet aggregatory drugs	2	2	2	3	-	1	1	1	-	-	1
BP503T.3	Describe the complete pharmacology of autacoids, NSAIDs and drugs act on inflammatory disorders like gout and rheumatoid arthritis	2	1	1	-	-	1	3	2	-	-	-
BP503T.4	Explain the mechanism of action and Pharmacology of drugs acting on endocrine system	2	2	2	1	-	1	-	-	-	-	-
BP503T.5	Explain the mechanism of action and Pharmacology of drugs acting on endocrine system including male and female sex hormones & describe the importance of bioassays	2	1	-	-	-	2	1	1	-	-	1

### Sample Question Paper

Amity School of Pharmacy Department of Pharmacology I MID-SEMESTER(SEM-V)2021-22		
Class: B.Pharm. V Semester		
Subject Name: Pharmacology-II Theory	Time:1 Hrs 	Max.Marks:30



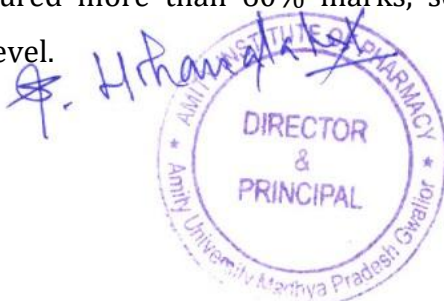
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

CO Map	Question No.	Question	Marks
CO1	Q.1	Write a note on progesterone hormone	2
CO1	Q.2	List out any two functions of serotonin.	2
	Q.3	Write different type of bioassays.	2
CO2	Q.4	Write down the mechanism of action of NSAID	2
CO2	Q.5	Write down the mechanism of action of metformin	2
CO1	Q.6	Give the classification of Anti-hyperlipidemic drugs with their MOA.	10
CO2	Q.7	Discuss about anti-diabetic agents with mechanism of action	10
CO2	Q.8	Explain the pharmacological actions of prostaglandins	5
	Q.9	Explain the bioassays methods of Insulin.	5
CO2	Q.10	Classify the anti-thyroid drugs and anti-gout drugs	5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**No Attainment Level:**

57% Percentage of students secured more than 60% marks, so this course PHARMACOLOGY II – THEORY (BP503T) not attained Level.





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# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACOGNOSY

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### Programme Outcomes:

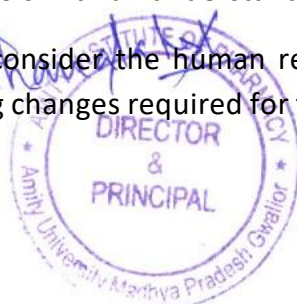
**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and



societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “-”



**PROGRAMME ARTICULATION  
MATRIX**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
V SEM																
	BP504T	3	1	1	1	3	6	7	8	9	3	2		-	2	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*H. H. H.*



DIRECTOR  
&  
PRINCIPAL



# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

## DEPARTMENT OF PHARMACOGNOSY

### Course Handout

Course : Pharmacognosy and Phytochemistry–2nd THEORY

Course Code : BP504T Crédits : 04, Session :2023-24 (Odd Sem.), Class : B.Pharm. 3rd Year

Faculty Name: Dr. Narender Kumar

- A. Introduction:** It explores the study of medicinal plants, focusing on the isolation, identification, and therapeutic properties of phytoconstituents. This subject equips students with in-depth knowledge of herbal drugs, phytochemical techniques, and their applications in pharmaceutical and healthcare industries.
- B. Course Outcomes:** At the end of the course, students will be able to:
- BP504T.1.** . To know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents
  - BP504T.2.** To understand the preparation and development of herbal formulation
  - BP504T.3.** To understand the herbal drug interactions
  - BP504T.4.** To carryout isolation and identification of phytoconstituents
  - BP504T.5.** To impart the students the knowledge of how the secondary metabolites are produced in the crude drugs, how to isolate and identify
- C. Programme Outcomes:**
- [PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
- [PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
- [PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
- [PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
- [PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.



**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**D. Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	3%
	Student – Teacher interaction	S-T I	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>



## E. Syllabus

### UNIT – I

Metabolic pathways in higher plants and their determination

a) Brief study of basic metabolic pathways and formation of different secondary metabolites through these pathways- Shikimic acid pathway, Acetate pathways and Amino acid pathway. b) Study of utilization of radioactive isotopes in the investigation of biogenetic studies.

### UNIT – II

General introduction, composition, chemistry & chemical classes, biosources, therapeutic uses and commercial applications of following secondary metabolites:

Alkaloids: Vinca, Rauwolfia, Belladonna, Opium,

Phenylpropanoids and Flavonoids: Lignans, Tea, Ruta

Steroids, Cardiac Glycosides & Triterpenoids: Liquorice, Dioscorea, Digitalis

Volatile oils: Mentha, Clove, Cinnamon, Fennel, Coriander,

Tannins: Catechu, Pterocarpus

Resins: Benzoin, Guggul, Ginger, Asafoetida, Myrrh, Colophony

Glycosides: Senna, Aloes, Bitter Almond

Iridoids, Other terpenoids & Naphthaquinones: Gentian, Artemisia, taxus, carotenoids

### UNIT – III

Isolation, Identification and Analysis of Phytoconstituents

a) Terpenoids: Menthol, Citral, Artemisin

b) Glycosides: Glycyrrhetic acid & Rutin

c) Alkaloids: Atropine, Quinine, Reserpine, Caffeine

d) Resins: Podophyllotoxin, Curcumin

**UNIT – IV** Industrial production, estimation and utilization of the following phytoconstituents:

Forskolin, Sennoside, Artemisinin, Diosgenin, Digoxin, Atropine, Podophyllotoxin, Caffeine, Taxol, Vincristine and Vinblastine

**UNIT – V** Basics of Phytochemistry

Modern methods of extraction, application of latest techniques like Spectroscopy, chromatography and electrophoresis in the isolation, purification and identification of crude drugs.

### F. Examination Scheme:

Components	A	CT	S/V/Q/HA	STI	EE
Weightage (%)	4	15	3	3	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination; A: Attendance

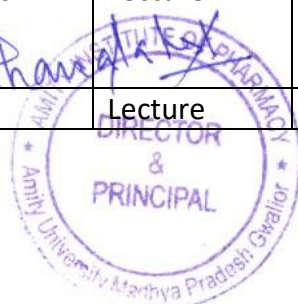


### G. Suggested Text/Reference Books:

1. W.C.Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Saunders & Co., London, 2009.
2. Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers & Distribution, New Delhi.
3. Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi.
4. Herbal drug industry by R.D. Choudhary (1996), 1st Edn, Eastern Publisher, New Delhi.
5. Essentials of Pharmacognosy, Dr.SH.Ansari, 11nd edition, Birla publications, New Delhi, 2007
6. Herbal Cosmetics by H.Pande, Asia Pacific Business press, Inc, New Delhi.
7. A.N. Kalia, Textbook of Industrial Pharmacognosy, CBS Publishers, New Delhi, 2005.
8. R Endress, Plant cell Biotechnology, Springer-Verlag, Berlin, 1994.
9. Pharmacognosy & Pharmacobiotechnology. James Bobbers, Marilyn KS, VE Tylor.
10. The formulation and preparation of cosmetic, fragrances and flavours.
11. Remington's Pharmaceutical sciences.
12. Text Book of Biotechnology by Vyas and Dixit.
13. Text Book of Biotechnology by R.C. Dubey.

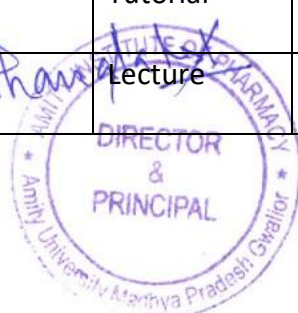
### H. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Brief study of basic metabolic pathways	Lecture	1,5	Mid Term-1, Quiz & End Sem Exam
2	formation of different secondary metabolites	Lecture	1,5	Mid Term-1, Quiz & End Sem Exam
3	Shikimic acid pathway	Lecture	1,5	Mid Term-1, Quiz & End Sem Exam
4	Quiz	Tutorial		Mid Term-1, Quiz & End Sem Exam
5	Acetate pathway	Lecture	1,5	Mid Term-1, Quiz & End Sem Exam
6	Amino acid pathway	Lecture	1,5	Mid Term-1, Quiz & End Sem Exam
7	Utilization of radioactive isotopes	Lecture	1,5	Mid Term-1, Quiz & End Sem Exam
8	Quiz	Tutorial		Mid Term-1, Quiz & End Sem Exam
9	Investigation of biogenetic studies	Lecture	1,5	Mid Term-1, Quiz & End Sem Exam
10	Alkaloids	Lecture	1,3	Mid Term-1, Quiz

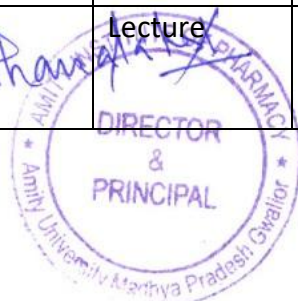




				& End Sem Exam
11	Vinca, Rauwolfia	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
12	Seminar	Tutorial		Mid Term-1, Quiz & End Sem Exam
13	Belladonna, Opium	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
14	Phenylpropanoids and Flavonoids	Lecture	1,5	Mid Term-1, Quiz & End Sem Exam
15	Lignans, Tea, Rutin	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
16	Unit test	Tutorial		Mid Term-1, Quiz & End Sem Exam
17	Steroids, Cardiac Glycosides	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
18	Triterpenoids: Liquorice, Dioscorea	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
19	Digitalis	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
20	Group discussion on different topics	Tutorial		Mid Term-1, Quiz & End Sem Exam
21	Cinnamon, Fennel	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
22	Coriander and Tannins	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
23	Catechu, Pterocarpus	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
24	Quiz	Tutorial		Mid Term-1, Quiz & End Sem Exam
25	Resins: Benzoin	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
26	Guggul, Ginger	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
27	Asafoetida, Myrrh	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
28	Unit Test	Tutorial		Mid Term-1, Quiz & End Sem Exam
29	Colophony	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
30	Glycosides	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
31	Senna, Aloe	Lecture	1,3	Mid Term-2, Quiz & End Sem Exam
32	Group discussion	Tutorial		Mid Term-2, Quiz & End Sem Exam
33	Bitter Almond	Lecture	1,3	Mid Term-2, Quiz & End Sem Exam



34	Iridoids, Other terpenoids	Lecture	1,3	Mid Term-2, Quiz & End Sem Exam
35	Naphthaquinones	Lecture	3	Mid Term-2, Quiz & End Sem Exam
36	Seminar	Tutorial		Mid Term-2, Quiz & End Sem Exam
37	Gentian, Artemisia	Lecture	1,3	Mid Term-2, Quiz & End Sem Exam
38	Taxus, carotenoids	Lecture	1,3	Mid Term-2, Quiz & End Sem Exam
39	Terpenoids: Menthol	Lecture	1,3	Mid Term-2, Quiz & End Sem Exam
40	Unit test	Tutorial		Mid Term-2, Quiz & End Sem Exam
41	Glycosides: Glycyrrhetic acid	Lecture	1,5	Mid Term-2, Quiz & End Sem Exam
42	Alkaloids: Atropine, Quinine	Lecture	1,5	Mid Term-2, Quiz & End Sem Exam
43	Reserpine, Caffeine	Lecture	1,3	Mid Term-2, Quiz & End Sem Exam
44	Seminar	Tutorial		Mid Term-2, Quiz & End Sem Exam
45	Resins: Podophyllotoxin, Curcumin	Lecture	1,4	Mid Term-2, Quiz & End Sem Exam
46	Industrial production, estimation and utilization of the following phytoconstituents: Forskolin, Sennoside	Lecture	2,4	Mid Term-2, Quiz & End Sem Exam
47	Artemisinin, Diosgenin	Lecture	1,2,4	Quiz & End Sem Exam
48	Quiz	Tutorial		Quiz & End Sem Exam
49	Digoxin, Atropine	Lecture	1,2,4	Quiz & End Sem Exam
50	Podophyllotoxin, Caffeine	Lecture	1,2,4	Quiz & End Sem Exam
51	Taxol, Vincristine	Lecture	1,2,4	Quiz & End Sem Exam
52	Group discussion	Tutorial		Quiz & End Sem Exam
53	Modern methods of extraction	Lecture	2	Quiz & End Sem Exam
54	Spectroscopy techniques	Lecture	4,5	Quiz & End Sem Exam



55	Chromatography and electrophoresis	Lecture	4,5	Quiz & End Sem Exam
56	Unit test	Tutorial		Quiz & End Sem Exam
57	Isolation, purification and identification of crude drugs by spectroscopical , chromatography and electrophoresis	Lecture	2,4,5	Quiz & End Sem Exam
58	Basic principles of traditional system of medicine	Lecture	4,5	Quiz & End Sem Exam
59	Vinblastine,Rutin	Lecture	1,4,5	Quiz & End Sem Exam
60	Unit test	Tutorial		Quiz & End Sem Exam

### I. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
<b>BP504T.1</b>	<b>BP504T.1.</b> To know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents	3	-	-	2	2	2	-	-	-	-	3		1	2	-
<b>BP504T.2.</b>	<b>BP504T.2.</b> To understand the preparation and development of herbal formulation	3	-	-	2	-	2	-	-	-	-	3		2	1	1



<b>BP504T.3.</b>	<b>BP504T.3.</b> To understand the herbal drug interactions	3	2	-	2	-	2	-	-	-	-	3	-	1	1
<b>BP504T.4.</b>	<b>BP504T.4.</b> To carryout isolation and identification of phytoconstituents	3	2	-	1	-	1	-	2	2	-	3	-	1	-
<b>BP504T.5.</b>	<b>BP504T.5.</b> To impart the students the knowledge of how the secondary metabolites are produced in the crude drugs, how to isolate and identify	3	-	-	2	-	-	-	-	-	-	3	-	2	-

### Sample Question Paper

Amity Institute of Pharmacy Department of Pharmacognosy I MID-SEMESTER (SEM –5 <sup>th</sup> ) 2023-24						
Class: B.Pharm, 5thSemester						
Subject Name: BP603T Herbal Drug Technology Theory		Time: 1 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,3,4,5	Q.6,8,9	Q.2	Q.7, 10		
The student will be able to						


  
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 Amity University, Madhya Pradesh Cwalior

- CO1.** To know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents
- CO2.** To understand the preparation and development of herbal formulation
- CO3.** To impart the students the knowledge of how the secondary metabolites are produced in the crude drugs, how to isolate and identifyTo understand the herbal drug interactions
- CO4.** To carryout isolation and identification of phytoconstituents
- CO5.** To impart the students the knowledge of how the secondary metabolites are produced in the crude drugs, how to isolate and identify.

CO Map	Question No.	Question	Marks
CO4	Q.1	Define metabolic pathways. Enlist the various basic metabolic pathways.	2
CO5	Q.2	Name and draw the structures of the Mevalonic Acid Pathway precursors.	2
CO1	Q.3	Define flavonoids. Name the seven subclasses of flavonoids with the basic skeleton of flavonoid structure.	2
CO2	Q.4	Write the biological source of Clove. Draw the structure of Eugenol.	2
CO3	Q.5	Discuss in brief the qualitative analysis (Tests) of cardiac glycosides.	2
CO1	Q.6	Discuss the Shikimic Acid Pathway in detail, explaining the role of each enzyme involved. Draw a step-by-step reaction scheme of the pathway, labeling the enzymes and reactions at each stage.	10
CO4	Q.7	Give a brief account of the introduction, composition, chemistry, and therapeutical applications of Rauwolfia, and Digitalis.	10
CO3	Q.8	Discuss the various steps involved in tracer technique	5
CO2	Q.9	Write a note on the various classifications of alkaloids. Mention the identification tests of alkaloids.	5
CO4	Q.10	Discuss in detail the pharmacognosy of Tea.	5

*S. H. H. H.*



Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**No Attainment Level:**

45.3 % Percentage of students secured more than 60% marks, so this course Pharmacognosy and Phytochemistry–II Theory (BP504T) not attained any Level.

*A. H. H. H.*



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&  
PRINCIPAL

*[Handwritten Signature]*





# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICS

## PROGRAMME OUTCOMES AND PROGRAMME-SPECIFIC OUTCOMES

**Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24**

### **Program Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills, and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific inquiry, thinking analytically, clearly, and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

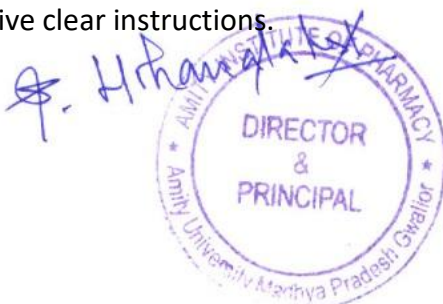
**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership, and team-building when planning changes required for the fulfillment of practice, and professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication, and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.





**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

### **Programme Specific Outcomes:**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “- “



**PROGRAMME ARTICULATION  
MATRIX**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
V SEM	BP505T	3	-	1	-	2	3	3	-	3	-	-		2	3	3

*H. H. H.*



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## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

### Course Handout

Course: PHARMACEUTICAL JURISPRUDENCE THEORY

Course Code : BP505T, Crédits : 04, Session :2023-24 (Odd Sem.), Class : B.Pharm. 3rd Year

Faculty Name: Ms. Ankita Kishore

- A. Introduction:** This course is designed to impart basic knowledge on important legislations related to the profession of pharmacy
- B. Course Outcomes:** At the end of the course, students will be able to:
- BP505T.1. Interpret** the Pharmaceutical legislations and their implications in the development, manufacturing, and marketing of pharmaceuticals.
  - BP505T.2 Relate** Various Indian Pharmaceutical Acts and Laws with the Pharmacy profession
  - BP505T.3. Identify** The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals.
  - BP505T.4. Apply** The code of ethics during the pharmaceutical practice.
  - BP505T.5. Make use of** guidelines for using animals for experimentation
  - BP505T.6. Distinguish** various types of Intellectual Property Rights.
- C. Programme Outcomes:**
- [PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
- [PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
- [PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
- [PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
- [PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.



**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**D. Programme Specific Outcomes:**

**PSO 1:** Will be able to design, develop and implement efficient software for a given real life problem.

**PSO 2:** Will be able to apply knowledge of AI, Machine Learning and Data Mining in analyzing big data forextracting useful information from it and for performing predictive analysis.

**PSO 3:** Will be able to design, manage and secure wired/ wireless computer networks for transfer and sharing of information.

**E. Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	3%
	Student – Teacher interaction	S-T I	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%



End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

## F. Syllabus

### UNIT – I

Drugs and Cosmetics Act, 1940 and its rules 1945: Objectives, Definitions, Legal definitions of schedules to the Act and Rules Import of drugs – Classes of drugs and cosmetics prohibited from import, Import under license or permit. Offences and penalties. Manufacture of drugs – Prohibition of manufacture and sale of certain drugs, Conditions for grant of license and conditions of license for manufacture of drugs, Manufacture of drugs for test, examination and analysis, manufacture of new drug, loan license and repacking

### UNIT – II

Detailed study of Schedule G, H, M, N, P, T, U, V, X, Y, Part XII B, Sch F & DMR (OA) Sale of Drugs – Wholesale, Retail sale and Restricted license. Offences and penalties Labeling & Packing of drugs- General labeling requirements and specimen labels for drugs and cosmetics, List of permitted colors. Offences and penalties. Administration of the Act and Rules – Drugs Technical Advisory Board, Central drugs Laboratory, Drugs Consultative Committee, Government drug analysts, Licensing authorities, controlling authorities, Drugs Inspectors

### UNIT – III

**Pharmacy Act –1948:** Objectives, Definitions, Pharmacy Council of India; its constitution and functions, Education Regulations, State and Joint state pharmacy councils; constitution and functions, Registration of Pharmacists, Offences and Penalties

**Medicinal and Toilet Preparation Act –1955:** Objectives, Definitions, Licensing, Manufacture In bond and Outside bond, Export of alcoholic preparations, Manufacture of Ayurvedic, Homeopathic, Patent & Proprietary Preparations. Offences and Penalties.

**Narcotic Drugs and Psychotropic substances Act-1985 and Rules:** Objectives, Definitions, Authorities and Officers, Constitution and Functions of narcotic & Psychotropic Consultative Committee, National Fund for Controlling the Drug Abuse, Prohibition, Control and Regulation, opium poppy cultivation and production of poppy straw, manufacture, sale and export of opium, Offences and Penalties

### UNIT – IV

**Study of Salient Features of Drugs and Magic Remedies Act and its rules:** Objectives, Definitions, Prohibition of certain advertisements, Classes of Exempted advertisements, Offences and Penalties

**Prevention of Cruelty to animals Act-1960:** Objectives, Definitions, Institutional Animal Ethics Committee, CPCSEA guidelines for Breeding and Stocking of Animals, Performance of Experiments, Transfer and acquisition of animals for experiment, Records, Power to suspend or revoke registration, Offences and Penalties

**National Pharmaceutical Pricing Authority:** Drugs Price Control Order (DPCO)- 2013. Objectives, Definitions, Sale prices of bulk drugs, Retail price of formulations, Retail price and ceiling price of scheduled formulations, National List of Essential Medicines (NLEM)

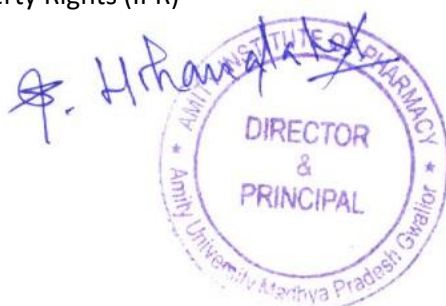
### UNIV – V

**Pharmaceutical Legislations –** A brief review, Introduction, Study of drugs enquiry committee, Health survey and development committee, Hathi committee and Mudaliar committee

**Code of Pharmaceutical ethics** Definition, Pharmacist in relation to his job, trade, medical profession and his profession, Pharmacist's oath •

### **Medical Termination of Pregnancy Act**

- Right to Information Act
- Introduction to Intellectual Property Rights (IPR)



**G. Examination Scheme:**

Components	A	CT	S/V/Q/HA	STI	EE
Weightage (%)	4	15	3	3	75

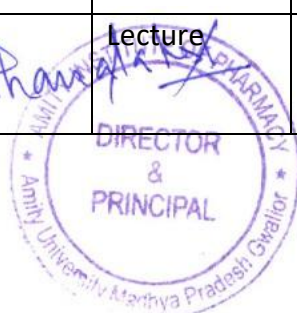
CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination; A: Attendance

**H. Suggested Text/Reference Books:**

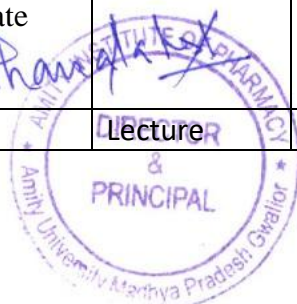
1. Forensic Pharmacy by B. Sures
2. Text book of Forensic Pharmacy by B.M. Mithal .
3. Handbook of drug law-by M.L. Mehra
4. A textbook of Forensic Pharmacy by N.K. Jain
5. Drugs and Cosmetics Act/Rules by Govt. of India publications.
6. Medicinal and Toilet preparations act 1955 by Govt. of India publications.
7. Narcotic drugs and psychotropic substances act by Govt. of India publications
8. Drugs and Magic Remedies act by Govt. of India publication
9. Bare Acts of the said laws published by Government. Reference books (Theory)

**I. Lecture Plan**

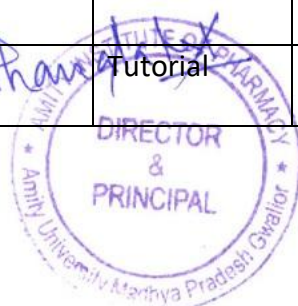
Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	<b><u>Drugs and Cosmetics Act, 1940 and its rules 1945:</u></b> Objectives, Definitions, Legal definitions of schedules to the Act and	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
2	Rules Import of drugs – Classes of drugs and cosmetics prohibited from import,	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
3	Import under license or permit. Offenses and penalties.	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
4	Discussion on basics of Drugs and Cosmetics Act, 1940 and its rules 1945	Tutorial	1,2	Mid Term-1, Quiz & End Sem Exam
5	Manufacture of drugs – Prohibition of manufacture and sale of certain drugs,	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
6	Conditions for grant of license and conditions of license for manufacture of drugs,	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
7	Manufacture of drugs for test, examination and analysis,	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam



8	Doubt clearing session	Tutorial	1,2,3	Mid Term-1, Quiz & End Sem Exam
9	manufacture of new drug, loan license and repacking license.	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
10	<b><u>Drugs and Cosmetics Act, 1940 and its rules 1945.</u></b> Detailed study of Schedule G, H, M, N, P,T,U, V, X, Y, Part XII B, Sch F & DMR (OA)	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
11	Detailed study of Schedule G, H, M, N, P,T,U, V, X, Y, Part XII B, Sch F & DMR (OA)	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
12	Revision of all schedules	Tutorial		Mid Term-1, Quiz & End Sem Exam
13	Sale of Drugs – Wholesale, Retail sale and Restricted license. Offences and penalties	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
14	Labeling & Packing of drugs- General labeling requirements and specimen labels for drugs and cosmetics	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
15	List of permitted colors. Offences and penalties. Administration of the Act and Rules – Drugs Technical Advisory Board	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
16	Class test	Tutorial	1,2,3	Mid Term-1, Quiz & End Sem Exam
17	Central drugs Laboratory, Drugs Consultative Committee	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
18	Government drug analysts, Licensing authorities, controlling authorities, Drugs Inspectors	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
19	<b><u>Pharmacy Act –1948:</u></b> Objectives, Definitions, Pharmacy Council of India; its constitution and functions	Lecture	1,2,3	Mid Term-1, Quiz & End Sem Exam
20	Group discussion on various authorities	Tutorial	1,3	Mid Term-1, Quiz & End Sem Exam
21	Education Regulations, State and Joint state pharmacy councils	Lecture	1,2,3	Mid Term-1, Quiz & End Sem Exam
22	constitution and functions of Education Regulations, State and Joint state pharmacy councils	Lecture	1,2,3	Mid Term-1, Quiz & End Sem Exam
23	Registration of	Lecture	1,2,3	Mid Term-1, Quiz

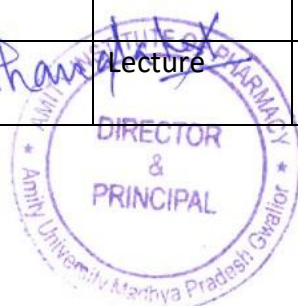


	Pharmacists, Offences & Penalties			& End Sem Exam
24	Quiz	Tutorial	1,2,3	Mid Term-1, Quiz & End Sem Exam
25	<b><u>Medicinal and Toilet Preparation Act –1955:</u></b> Objectives, Definitions, Licensing	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
26	Manufacture In bond and Outside bond, Export of alcoholic preparations	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
27	Manufacture of Ayurvedic, Homeopathic, Patent & Proprietary Preparations. Offences and Penalties.	Lecture	1,2,3	Mid Term-1, Quiz & End Sem Exam
28	Revision	Tutorial	1,2,3	Mid Term-1, Quiz & End Sem Exam
29	<b><u>Narcotic Drugs and Psychotropic substances Act-1985 and Rules:</u></b> Objectives, Definitions, Authorities and Officers,	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
30	Constitution and Functions of narcotic & Psychotropic Consultative Committee, National Fund for Controlling the Drug Abuse	Lecture	1,2,3	Mid Term-1, Quiz & End Sem Exam
31	Prohibition, Control and Regulation, opium poppy cultivation and production of poppy straw	Lecture	1,2	Mid Term-2, Quiz & End Sem Exam
32	Seminar	Tutorial	1,2,3	Mid Term-2, Quiz & End Sem Exam
33	manufacture, sale and export of opium, Offences and Penalties	Lecture	1,2	Mid Term-2, Quiz & End Sem Exam
34	<b><u>Study of Salient Features of Drugs and Magic Remedies Act and its rules:</u></b> Objectives, Definitions, Prohibition of certain advertisements, Classes of Exempted advertisements, Offences and Penalties	Lecture	1,2	Mid Term-2, Quiz & End Sem Exam
35	<b><u>Prevention of Cruelty to animals Act-1960:</u></b> Objectives, Definitions, Institutional Animal Ethics Committee,	Lecture	1,2,3,5	Mid Term-2, Quiz & End Sem Exam
36	Group discussion on various guidelines for	Tutorial	1,2,3,4,5	Mid Term-2, Quiz & End Sem Exam





	utilizing in Prevention of Cruelty to animals Act			
37	CPCSEA guidelines for Breeding and Stocking of Animals,	Lecture	1,2,5	Mid Term-2, Quiz & End Sem Exam
38	Performance of Experiments, Transfer and acquisition of animals for experiment	Lecture	1,2,5	Mid Term-2, Quiz & End Sem Exam
39	Records, Power to suspend or revoke registration, Offences and Penalties	Lecture	1,2,5	Mid Term-2, Quiz & End Sem Exam
40	Seminar	Tutorial	1,2,3,4,5	Mid Term-2, Quiz & End Sem Exam
41	<b><u>National Pharmaceutical Pricing Authority:</u></b> Drugs Price Control Order (DPCO)- 2013. Objectives, Definitions, Sale prices of bulk drugs,	Lecture	1,2,3	Mid Term-2, Quiz & End Sem Exam
42	Retail price of formulations, Retail price and ceiling price of scheduled formulations, National List of Essential Medicines (NLEM)	Lecture	1,2,3	Mid Term-2, Quiz & End Sem Exam
43	<b><u>Pharmaceutical Legislations</u></b> – A brief review, Introduction, Study of drugs enquiry committee,	Lecture	1,2,3	Mid Term-2, Quiz & End Sem Exam
44	Revision class	Tutorial	1,2,3,4,5	Mid Term-2, Quiz & End Sem Exam
45	Health survey and development committee, Hathi committee and Mudaliar committee	Lecture	1,2,3	Mid Term-2, Quiz & End Sem Exam
46	<b><u>Code of Pharmaceutical ethics</u></b> Definition, Pharmacist in relation to his job,	Lecture	1,2,4	Mid Term-2, Quiz & End Sem Exam
47	trade, medical profession and his profession, Pharmacist's oath	Lecture	1,2,4	Quiz & End Sem Exam
48	Doubt clearing session	Tutorial	1,2,3	Quiz & End Sem Exam
49	Medical Termination of Pregnancy Act	Lecture	1,2	Quiz & End Sem Exam
50	Medical Termination of Pregnancy Act	Lecture	1,2	Quiz & End Sem Exam



51	Right to Information A	Lecture	1,2,4	Quiz & End Sem Exam
52	Quiz	Tutorial	1,2,3	Quiz & End Sem Exam
53	Right to Information A	Lecture	1,2,4	Quiz & End Sem Exam
54	Introduction to Intellectual Property Rights (IPR)	Lecture	1,2,5	Quiz & End Sem Exam
55	Introduction to Intellectual Property Rights (IPR)	Lecture	1,2,5	Quiz & End Sem Exam
56	General Discussion on IPR	Tutorial	1,2,3,4,5	Quiz & End Sem Exam
57	Introduction to Intellectual Property Rights (IPR)	Lecture	1,2,5	Quiz & End Sem Exam
58	Introduction to Intellectual Property Rights (IPR)	Lecture	1,2,5	Quiz & End Sem Exam
59	Introduction to Intellectual Property Rights (IPR)	Lecture	1,2,5	Quiz & End Sem Exam
60	Class test	Tutorial	1,2,3,4,5,6	Quiz & End Sem Exam

#### J. Course Articulation Matrix (Mapping of COs with POs)

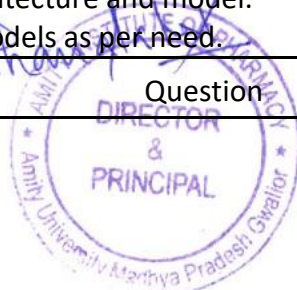
CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
<b>BP505T.1</b>	<b>Interpret</b> the Pharmaceutical legislations and their implications in the development, manufacturing, and marketing of pharmaceuticals.	3	-	1	-	2	1	2	-	1	-	-		3	0	3
<b>BP505T.2.</b>	<b>Relate</b> Various Indian Pharmaceutical Acts and Laws with Pharmacy profession	3	-	3	-	2	1	3	-	1	-	2		0	0	3



<b>BP505T.3.</b>	<b>Identify</b> The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals.	3	-	-	-	1	2	-	-	-	-	-	1	1	3
<b>BP505T.4.</b>	<b>Apply</b> the code of ethics during the pharmaceutical practice.	3	-	3	-	3	3	3	-	3	-	-	2	0	3
<b>BP505T.5.</b>	<b>Make use of</b> guidelines for using animals for experimentation	3	-	2	-	-	2	3	-	1	-	-	3	3	3
<b>BP505T.6.</b>	<b>Distinguish</b> various types of Intellectual Property Rights.	3	-	3	-	-	3	3	-	2	-	-	3	1	3

**Sample Question Paper**

Amity Institute of Pharmacy Department of Pharmaceutics I MID-SEMESTER (SEM –Vth) 2023-24						
Class: B.Pharm, Vth Semester						
Subject Name: BP505T Pharmaceutical Jurisprudence Theory		Time: 1 Hr			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1, 4, 7, 10	Q.2 ,5, 6, 9	Q. 8	Q. 3		
Student will be able to CO1: List the broad perceptive of cloud architecture and model. CO2: Apply different cloud programming models as per need.						
CO Map	Question No.	Question				Marks



CO1	Q.1	<b>Define</b> the terms Misbranded and spurious drug.	2
CO3	Q.2	<b>Compare</b> the constitution of the state pharmacy council, and central pharmacy council.	2
CO1	Q.3	<b>Distinguish</b> between whole sale and retail sale.	2
CO2	Q.4	<b>List</b> the names of permitted colors approved by the FDA to use in drugs and cosmetics.	2
CO1 CO3	Q.5	<b>Explain</b> the special labelling requirement for alcoholic preparations.	2
	Q.6	<b>Explain</b> the steps of manufacturing under bonded laboratory.	10
CO4	Q.7	<b>Which</b> types of drugs are Prohibited from importing into India?	10
CO3	Q.8	<b>Organize</b> the level of priority among the Pharmacy Council of India, State Council of India & joint state of Pharmacy council based on their functions.	5
CO3	Q.9	<b>Build</b> a relationship between the Institutional Animal Ethics Committee, CPCSEA	5
CO1	Q.10	<b>Tell</b> about Intellectual property rights.	5

Attainments		Rubric
<b>Level</b>	1	IF 60% of students secure more than 60% marks then level 1
<b>Level</b>	2	IF 70% of students secure more than 60% marks then level 2
<b>Level</b>	3	IF 80% of students secure more than 60% marks then level 3

**No Attainment Level:**

39.53% Percentage of students secured more than 60% marks, so this course Pharmaceutical Jurisprudence-THEORY (BP505T) not attained Level.



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AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICS

## PROGRAMME OUTCOMES

**Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24**

### **Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Posses knowledge and compression of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

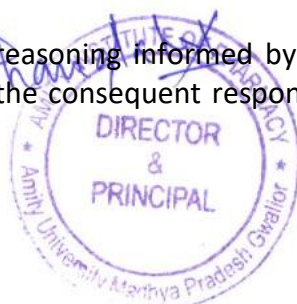
**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team -building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well- being.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.





AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

AMITY INSTITUTE OF PHARMACY

## PROGRAMME OUTCOMES

### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

#### Programme Outcomes:

**[PO.1]. Pharmacy Knowledge:** Posses knowledge and compression of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices

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**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess



societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self- assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “-“

PROGRAMME ARTICULATION MATRIX												
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
V SEM	BP 507 P	3	3	3	3	1	3	2	1	3	1	2







## DEPARTMENT OF PHARMACY

### Course Handout

Course : Pharmacology-II (Practical)

Course Code : BP507P, Crédits : 02, Session : 2023-24 (Odd Sem.), Class : B. Pharm. 3rd Year

Faculty Name : Dr. Monika Kaushik

- A. Introduction:** This subject is designed to impart fundamental and practical knowledge of pharmaceutical additives and various pharmaceutical dosage forms on the performance of the drug product.
- B. Course Outcomes:** At the end of the course, students will be able to:
- BP507P.1.** Understand the various instruments and equipments used in the Pharmacology experiments and in vitro techniques of pharmacology.
  - BP507P.2.** Dose response curve of various drugs such as acetylcholine and histamine
  - BP507P.3.** PA<sub>2</sub> and PD<sub>2</sub> value determination.
  - BP507P.4.** Bioassay of various drug using ex-pharm software.
  - BP507P.5** Evaluation of various drugs for their analgesic, anti-inflammatory and diuretic activity.
- C. Programme Outcomes:**
- A. Programme Outcomes:**
- [PO.1]. Drug Classification and Mechanisms:** Demonstrate a clear understanding of drug classifications and mechanisms for respiratory, gastrointestinal, and infectious disease treatments.
  - [PO.2]. Therapeutic Applications:** Identify and explain the therapeutic effects and clinical uses of key drugs within respiratory and gastrointestinal systems, and immuno-pharmacology.
  - [PO.3]. Drug Safety and Contraindications:** Analyze the side effects, contraindications, and safety profiles of various drugs, applying this knowledge to ensure safe medication practices.
  - [PO.4]. Principles of Toxicology:** Apply the principles of toxicology to assess drug toxicity, recognize toxic reactions, and recommend appropriate management strategies.
  - [PO.5]. Chronopharmacology Insight:** Understand the role of biological rhythms in pharmacology and apply chronopharmacological principles to enhance drug effectiveness and reduce side effects.
  - [PO.6]. Evidence-Based Pharmacology:** Cultivate skills in evaluating pharmacological research, enabling evidence-based application of drugs in clinical settings.
  - [PO.7]. Critical Decision-Making Skills:** Develop analytical and critical thinking abilities to evaluate therapeutic efficacy and make informed pharmacological decisions.
  - [PO.8]. Patient-Centric Care:** Emphasize patient safety and individualized care by understanding how pharmacology principles impact therapeutic outcomes and patient quality of life.



**[PO.9]. Pharmacological Problem-Solving:** Utilize pharmacology knowledge to solve complex clinical problems, including managing drug interactions and contraindications in multi-drug regimens.

**[PO.10]. Ethical and Professional Competence:** Foster a sense of ethical responsibility and professional competence in the administration and study of drugs, emphasizing the need for safety, accuracy, and empathy in healthcare.

**B. Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	20%
	Mid Term 2		
	A minimum of 80% attendance is required to be maintained by a student to be qualified for taking up the Odd Semester examination	A	4 %
	Practical Records/Regular viva/ Assignment	PR/RV/As	6%
End Semester Examination	End Semester Examination	EE	70%
<b>Total</b>			<b>100%</b>

PR: Practical Records, RV: Regular viva, As: Assignment

**C. Syllabus**

**Module I: Introduction:**

1. Introduction to in-vitro pharmacology and physiological salt solutions.

**Module II: Effect of drugs:**

2. Effect of drugs on isolated frog heart.
3. Effect of drugs on blood pressure and heart rate of dog.
4. Effect of spasmogens and spasmolytics using rabbit jejunum.
5. Anti-inflammatory activity of drugs using carrageenan induced paw edema model.
6. Analgesic activity of drug using central and peripheral methods



**Module III: DRC:**

7. Study of diuretic activity of drugs using rats/mice.
8. DRC of acetylcholine using frog rectus abdominis muscle.
9. Effect of physostigmine and atropine on DRC of acetylcholine using frog rectus abdominis muscle and rat ileum respectively.

**Module IV: Bioassays:**

10. Bioassay of histamine using guinea pig ileum by matching method.
11. Bioassay of oxytocin using rat uterine horn by interpolation method.
12. Bioassay of serotonin using rat fundus strip by three point bioassay.
13. Bioassay of acetylcholine using rat ileum/colon by four point bioassay.

**Module V: Determination of PA<sub>2</sub> & PD<sub>2</sub> value:**

14. Determination of PA<sub>2</sub> value of prazosin using rat anococcygeus muscle (by Schilds plot method).
15. Determination of PD<sub>2</sub> value using guinea pig ileum.

**D. Examination Scheme:**

Components	CT	A	PR/RV/As	EE
Weightage (%)	10	4	6	70

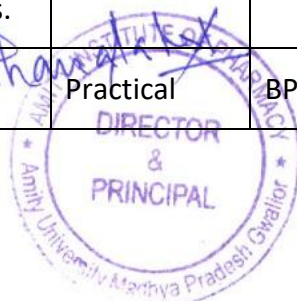
PR: Practical Records, RV: Regular viva, As: Assignment

**E. Suggested Text/Reference Books:**

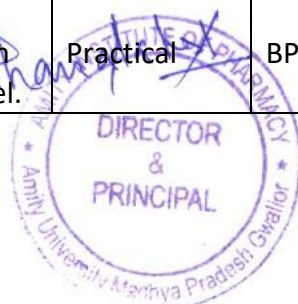
1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchill Livingstone Elsevier
2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill.
3. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
4. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs, The Point Lippincott Williams & Wilkins.
5. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews- Pharmacology.
6. K.D.Tripathi. Essentials of Medical Pharmacology, , JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.
7. Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher
8. Modern Pharmacology with clinical Applications, by Charles R.Craig & Robert.
9. Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata.
10. Kulkarni SK. Handbook of experimental pharmacology. Vallabh Prakashan.

**F. Lecture Plan**

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1.	Introduction to in-vitro pharmacology and physiological salt solutions.	Practical	BP507P	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
2.	Effect of drugs on isolated frog heart.	Practical	BP507P	Mid Term-1 & End Sem Exam as Synopsis/



				Experiments/ Viva voce for both
3.	Effect of drugs on blood pressure and heart rate of dog.	Practical	BP507P	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
4.	Study of diuretic activity of drugs using rats/mice.	Practical	BP507P	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
5.	DRC of acetylcholine using frog rectus abdominis muscle.	Practical	BP507P	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
6.	Effect of physostigmine and atropine on DRC of acetylcholine using frog rectus abdominis muscle and rat ileum respectively.	Practical	BP507P	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
7.	Bioassay of histamine using guinea pig ileum by matching method.	Practical	BP507P	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
8.	Bioassay of oxytocin using rat uterine horn by interpolation method.	Practical	BP507P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
9.	Bioassay of serotonin using rat fundus strip by three point bioassay.	Practical	BP507P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
10.	Bioassay of acetylcholine using rat ileum/colon by four point bioassay.	Practical	BP507P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
11.	Determination of PA <sub>2</sub> value of prazosin using rat anococcygeus muscle (by Schild's plot method).	Practical	BP507P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
12.	Determination of PD <sub>2</sub> value using guinea pig ileum.	Practical	BP507P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
13.	Effect of spasmogens and spasmolytics using rabbit jejunum.	Practical	BP507P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
14.	Anti-inflammatory activity of drugs using carrageenan induced paw-edema model.	Practical	BP507P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce



				for both
15.	Analgesic activity of drug using central and peripheral methods	Practical	BP507P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both

**G. Course Articulation Matrix (Mapping of COs with POs)**

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES										
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11
<b>BP507P.1</b>	Understand the various pharmaceutical dosage forms and their manufacturing techniques.	3	1	3	2	1	-	-	-	3	1	3
<b>BP507P.2</b>	Recall various considerations required in formulation of pharmaceutical dosage forms	3	2	2	2	-	-	-	-	1	-	2
<b>BP507P.3</b>	Formulate solid, liquid and semisolid dosage by using established procedures and technology.	3	1	2	2	-	1	-	-	2	-	1
<b>BP507P.4</b>	Conclude the facilities and standards necessary for the industrial production of sterile dosage forms and ophthalmic preparations.	3	1	2	2	-	1	-	1	-	-	1
<b>BP507P.5</b>	Select the glass containers required for the storage of the finished products.	2	2	2	1	1	1	-	-	-	-	1

*S. H. H. H.*  


**Sample Question Paper**

Amity Institute of Pharmacy Department of Pharmacy I MID-SEMESTER (SEM-V) 2023-24						
Class: B. Pharm V Semester						
Subject Name: BP 507 P. Pharmacology-II (Practical)		Time: 4 Hrs			Max. Marks: 40	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,3	Q.2	Q.3	Q.2	Q.2	
Student will be able to CO1: Understand the various pharmaceutical Bioassay techniques. CO2: Recall various considerations required in Experimental Pharmacology						
<b>CO Map</b>	<b>Question No.</b>	<b>Question</b>				<b>Marks</b>
CO1 and CO2	Q.1	Synopsis				10
CO1	Q.2	Perform the Bioassay of Histamine by using Three point				25
CO1 and CO2	Q.3	Viva voce				5

Attainments		Rubric
<b>Level</b>	1	IF 60% of students secure more than 60% marks then level 1
<b>Level</b>	2	IF 70% of students secure more than 60% marks then level 2
<b>Level</b>	3	IF 80% of students secure more than 60% marks then level 3

*A. H. H. H.*

AMITY INSTITUTE OF PHARMACY  
DIRECTOR & PRINCIPAL  
Amity University, Madhya Pradesh  
Gwalior

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self- assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “-“

PROGRAMME ARTICULATION MATRIX												
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
V SEM	BP 506P	3	3	3	3	1	3	2	1	3	1	2

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AMITY UNIVERSITY OF PHARMACY  
DIRECTOR & PRINCIPAL  
Amity University, Madhya Pradesh Gwalior



## DEPARTMENT OF PHARMACEUTICS

### Course Handout

Course : INDUSTRIAL PHARMACY-I (Practical)

Course Code : BP506P, Crédits : 02, Session : 2023-24 (Odd Sem.), Class : B. Pharm. 3rd Year

Faculty Name : Dr. Neeraj Mishra, Dr. Tanweer Haider

- A. Introduction:** This subject is designed to impart fundamental and practical knowledge of pharmaceutical additives and various pharmaceutical dosage forms on the performance of the drug product.
- B. Course Outcomes:** At the end of the course, students will be able to:
- BP506P.1.** Understand different pharmaceutical dosage forms and their manufacturing processes.
  - BP506P.2.** Identify key considerations in the formulation of pharmaceutical dosage forms.
  - BP506P.3.** Formulate solid, liquid, and semi-solid dosage forms using established procedures and technologies.
  - BP506P.4.** Determine the facilities and standards required for the industrial production of sterile dosage forms and ophthalmic preparations.
  - BP506P.5.** Choose appropriate glass containers for the storage of finished products.
- C. Programme Outcomes:**
- [PO.1]. Pharmacy Knowledge:** Posses knowledge and compression of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
  - [PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
  - [PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
  - [PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
  - [PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team -building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well- being.
  - [PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers,





employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

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**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self- assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### D. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	10%
	Mid Term 2		
	Lab record	LR	1%
	Viva	V	2%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	2%
End Semester Examination	End Semester Examination	EE	35%
<b>Total</b>			<b>50%</b>

PR: Practical Records, RV: Regular viva, As: Assignment

#### E. Syllabus

##### Module I: Preformulation Studies:

1. Preformulation studies on paracetamol/ any other drug
2. Preformulation studies on aspirin/ any other drug



**Module II: Tablets, granules and capsules:**

3. Preparation and evaluation of Paracetamol tablets
4. Preparation and evaluation of Aspirin tablets
5. Coating of tablets- film coating of tables/granules
6. Quality control test of (as per IP) marketed tablets
7. Quality control test of (as per IP) marketed capsules

**Module III: Injection:**

8. Preparation of Calcium Gluconate injection
9. Preparation of Ascorbic Acid injection

**Module IV: Ophthalmic Preparations:**

10. Preparation of Eye drops
11. Preparation of Eye ointments

**Module V: Creams & containers:**

12. Preparation of cold cream
13. Preparation of vanishing cream
14. Evaluation of Glass containers (as per IP)

**F. Examination Scheme:**

Components	A	CT	LR	V	EE
Weightage (%)	2	10	1	2	35

PR: Practical Records, RV: Regular viva, As: Assignment

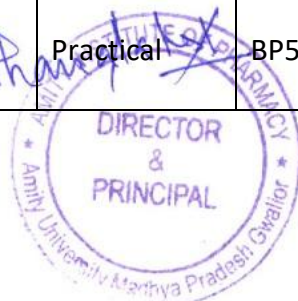
**G. Suggested Text/Reference Books:**

1. Pharmaceutical dosage forms - Tablets, volume 1 -3 by H.A. Liberman, Leon Lachman & J. B. Schwartz
2. Pharmaceutical dosage form - Parenteral medication vol- 1&2 by Liberman & Lachman
3. Pharmaceutical dosage form disperse system VOL-1 by Liberman & Lachman
4. Modern Pharmaceutics by Gilbert S. Banker & C.T. Rhodes, 3rd Edition
5. Remington: The Science and Practice of Pharmacy, 20th edition Pharmaceutical Science (RPS)
6. Theory and Practice of Industrial Pharmacy by Liberman & Lachman
7. Pharmaceutics- The science of dosage form design by M. E. Aulton, Churchill livingstone, Latest edition
8. Introduction to Pharmaceutical Dosage Forms by H. C. Ansel, Lea & Febiger, Philadelphia, 5th edition, 2005
9. Drug stability - Principles and practice by Cartensen & C.J. Rhodes, 3rd Edition, Marcel Dekker Series, Vol 107.



## H. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1.	Preformulation studies on paracetamol/ any other drug	Practical	BP506P	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
2.	Preformulation studies on aspirin/ any other drug	Practical	BP506P	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
3.	Preparation and evaluation of Paracetamol tablets	Practical	BP506P	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
4.	Preparation and evaluation of Aspirin tablets	Practical	BP506P	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
5.	Coating of tablets- film coating of tablets/granules	Practical	BP506P	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
6.	Quality control test of (as per IP) marketed tablets	Practical	BP506P	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
7.	Quality control test of (as per IP) marketed capsules	Practical	BP506P	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
8.	Preparation of Calcium Gluconate injection	Practical	BP506P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
9.	Preparation of Ascorbic Acid injection	Practical	BP506P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
10.	Preparation of Eye drops	Practical	BP506P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
11.	Preparation of Eye ointments	Practical	BP506P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
12.	Preparation of cold cream	Practical	BP506P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce



				for both
13.	Preparation of vanishing cream	Practical	BP506P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
14.	Evaluation of Glass containers (as per IP)	Practical	BP506P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
15.	Evaluation of Glass containers (as per IP)	Practical	BP506P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both

### I. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES										
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11
<b>BP506P.1</b>	Understand the various pharmaceutical dosage forms and their manufacturing techniques.	3	1	3	2	1	-	-	-	3	1	3
<b>BP506P.2</b>	Recall various considerations required in formulation of pharmaceutical dosage forms	3	2	2	2	-	-	-	-	1	-	2
<b>BP506P.3</b>	Formulate solid, liquid and semisolid dosage by using established procedures and technology.	3	1	2	2	-	1	-	-	2	-	1
<b>BP506P.4</b>	Conclude the facilities and standards necessary for the industrial production of sterile dosage forms and ophthalmic preparations.	3	1	2	2	-	1	-	1	-	-	1
<b>BP506P.5</b>	Select the glass containers required for the storage of the finished products.	2	2	2	1	1	1	-	-	-	-	1

*A. H. H. H.*  


## Sample Question Paper

Amity Institute of Pharmacy Department of Pharmacy I MID-SEMESTER (SEM-V) 2023-24						
Class: B. Pharm V Semester						
Subject Name: BP 506 P. Industrial Pharmacy-I (Practical)		Time: 4 Hrs			Max. Marks: 40	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,3	Q.2	Q.3	Q.2	Q.2	
Student will be able to CO1: Understand the various pharmaceutical dosage forms and their manufacturing techniques. CO2: Recall various considerations required in formulation of pharmaceutical dosage forms.						
<b>CO Map</b>	<b>Question No.</b>	<b>Question</b>				<b>Marks</b>
CO1 and CO2	Qs.1	Synopsis				10
CO1	Q.2 a	To perform the thickness, hardness, weight variation, friability and disintegration tests of given tablets sample.				15
CO2	Q.2 b	Carry out the quality control test of (as per IP) marketed tablets				6
CO1 and CO2	Q.3	Viva voce				3

<b>Attainments</b>		<b>Rubric</b>
<b>Level</b>	1	IF 60% of students secure more than 60% marks then level 1
<b>Level</b>	2	IF 70% of students secure more than 60% marks then level 2
<b>Level</b>	3	IF 80% of students secure more than 60% marks then level 3

### Attainment Level: Level III

94.2 % Percentage of students secured more than 60% marks, so this course Industrial Pharmacy I (Practical) (BP506P) and attended III Level.





AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

AMITY INSTITUTE OF PHARMACY

## PROGRAMME OUTCOMES

### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

#### Programme Outcomes:

**[PO.1]. Pharmacy Knowledge:** Posses knowledge and compression of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyse, evaluate and apply information systematically and shall make defensible decisions

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team -building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well- being.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess



societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self- assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “-“

PROGRAMME ARTICULATION MATRIX												
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
V SEM	BP 507 P	3	3	3	3	1	3	2	1	3	1	2





## DEPARTMENT OF PHARMACY

### Course Handout

Course : Pharmacology-II (Practical)

Course Code : BP507P, Crédits : 02, Session : 2023-24 (Odd Sem.), Class : B. Pharm. 3rd Year

Faculty Name : Dr. Monika Kaushik

- A. Introduction:** This subject is designed to impart fundamental and practical knowledge of pharmaceutical additives and various pharmaceutical dosage forms on the performance of the drug product.
- B. Course Outcomes:** At the end of the course, students will be able to:
- BP507P.1.** Understand the various instruments and equipments used in the Pharmacology experiments and in vitro techniques of pharmacology.
  - BP507P.2.** Dose response curve of various drugs such as acetylcholine and histamine
  - BP507P.3.** PA<sub>2</sub> and PD<sub>2</sub> value determination.
  - BP507P.4.** Bioassay of various drug using ex-pharm software.
  - BP507P.5** Evaluation of various drugs for their analgesic, anti-inflammatory and diuretic activity.
- C. Programme Outcomes:**
- A. Programme Outcomes:**
- [PO.1]. Drug Classification and Mechanisms:** Demonstrate a clear understanding of drug classifications and mechanisms for respiratory, gastrointestinal, and infectious disease treatments.
  - [PO.2]. Therapeutic Applications:** Identify and explain the therapeutic effects and clinical uses of key drugs within respiratory and gastrointestinal systems, and immuno-pharmacology.
  - [PO.3]. Drug Safety and Contraindications:** Analyze the side effects, contraindications, and safety profiles of various drugs, applying this knowledge to ensure safe medication practices.
  - [PO.4]. Principles of Toxicology:** Apply the principles of toxicology to assess drug toxicity, recognize toxic reactions, and recommend appropriate management strategies.
  - [PO.5]. Chronopharmacology Insight:** Understand the role of biological rhythms in pharmacology and apply chronopharmacological principles to enhance drug effectiveness and reduce side effects.
  - [PO.6]. Evidence-Based Pharmacology:** Cultivate skills in evaluating pharmacological research, enabling evidence-based application of drugs in clinical settings.
  - [PO.7]. Critical Decision-Making Skills:** Develop analytical and critical thinking abilities to evaluate therapeutic efficacy and make informed pharmacological decisions.
  - [PO.8]. Patient-Centric Care:** Emphasize patient safety and individualized care by understanding how pharmacology principles impact therapeutic outcomes and patient quality of life.





**[PO.9]. Pharmacological Problem-Solving:** Utilize pharmacology knowledge to solve complex clinical problems, including managing drug interactions and contraindications in multi-drug regimens.

**[PO.10]. Ethical and Professional Competence:** Foster a sense of ethical responsibility and professional competence in the administration and study of drugs, emphasizing the need for safety, accuracy, and empathy in healthcare.

**B. Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	20%
	Mid Term 2		
	A minimum of 80% attendance is required to be maintained by a student to be qualified for taking up the Odd Semester examination	A	4 %
	Practical Records/Regular viva/ Assignment	PR/RV/As	6%
End Semester Examination	End Semester Examination	EE	70%
<b>Total</b>			<b>100%</b>

PR: Practical Records, RV: Regular viva, As: Assignment

**C. Syllabus**

**Module I: Introduction:**

1. Introduction to in-vitro pharmacology and physiological salt solutions.

**Module II: Effect of drugs:**

2. Effect of drugs on isolated frog heart.
3. Effect of drugs on blood pressure and heart rate of dog.
4. Effect of spasmogens and spasmolytics using rabbit jejunum.
5. Anti-inflammatory activity of drugs using carrageenan induced paw edema model.
6. Analgesic activity of drug using central and peripheral methods



**Module III: DRC:**

- Study of diuretic activity of drugs using rats/mice.
- DRC of acetylcholine using frog rectus abdominis muscle.
- Effect of physostigmine and atropine on DRC of acetylcholine using frog rectus abdominis muscle and rat ileum respectively.

**Module IV: Bioassays:**

- Bioassay of histamine using guinea pig ileum by matching method.
- Bioassay of oxytocin using rat uterine horn by interpolation method.
- Bioassay of serotonin using rat fundus strip by three point bioassay.
- Bioassay of acetylcholine using rat ileum/colon by four point bioassay.

**Module V: Determination of PA<sub>2</sub> & PD<sub>2</sub> value:**

- Determination of PA<sub>2</sub> value of prazosin using rat anococcygeus muscle (by Schilds plot method).
- Determination of PD<sub>2</sub> value using guinea pig ileum.

**D. Examination Scheme:**

Components	CT	A	PR/RV/As	EE
Weightage (%)	10	4	6	70

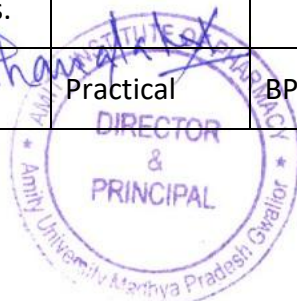
PR: Practical Records, RV: Regular viva, As: Assignment

**E. Suggested Text/Reference Books:**

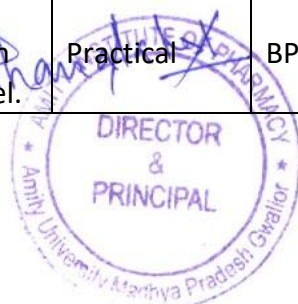
- Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchill Livingstone Elsevier
- Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill.
- Goodman and Gilman's, The Pharmacological Basis of Therapeutics
- Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs, The Point Lippincott Williams & Wilkins.
- Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews- Pharmacology.
- K.D.Tripathi. Essentials of Medical Pharmacology, , JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.
- Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher
- Modern Pharmacology with clinical Applications, by Charles R.Craig & Robert.
- Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata.
- Kulkarni SK. Handbook of experimental pharmacology. Vallabh Prakashan.

**F. Lecture Plan**

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1.	Introduction to in-vitro pharmacology and physiological salt solutions.	Practical	BP507P	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
2.	Effect of drugs on isolated frog heart.	Practical	BP507P	Mid Term-1 & End Sem Exam as Synopsis/



				Experiments/ Viva voce for both
3.	Effect of drugs on blood pressure and heart rate of dog.	Practical	BP507P	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
4.	Study of diuretic activity of drugs using rats/mice.	Practical	BP507P	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
5.	DRC of acetylcholine using frog rectus abdominis muscle.	Practical	BP507P	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
6.	Effect of physostigmine and atropine on DRC of acetylcholine using frog rectus abdominis muscle and rat ileum respectively.	Practical	BP507P	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
7.	Bioassay of histamine using guinea pig ileum by matching method.	Practical	BP507P	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
8.	Bioassay of oxytocin using rat uterine horn by interpolation method.	Practical	BP507P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
9.	Bioassay of serotonin using rat fundus strip by three point bioassay.	Practical	BP507P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
10.	Bioassay of acetylcholine using rat ileum/colon by four point bioassay.	Practical	BP507P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
11.	Determination of PA <sub>2</sub> value of prazosin using rat anococcygeus muscle (by Schilds plot method).	Practical	BP507P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
12.	Determination of PD <sub>2</sub> value using guinea pig ileum.	Practical	BP507P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
13.	Effect of spasmogens and spasmolytics using rabbit jejunum.	Practical	BP507P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
14.	Anti-inflammatory activity of drugs using carrageenan induced paw-edema model.	Practical	BP507P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce



				for both
15.	Analgesic activity of drug using central and peripheral methods	Practical	BP507P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both

### G. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES										
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11
<b>BP507P.1</b>	Understand the various pharmaceutical dosage forms and their manufacturing techniques.	3	1	3	2	1	-	-	-	3	1	3
<b>BP507P.2</b>	Recall various considerations required in formulation of pharmaceutical dosage forms	3	2	2	2	-	-	-	-	1	-	2
<b>BP507P.3</b>	Formulate solid, liquid and semisolid dosage by using established procedures and technology.	3	1	2	2	-	1	-	-	2	-	1
<b>BP507P.4</b>	Conclude the facilities and standards necessary for the industrial production of sterile dosage forms and ophthalmic preparations.	3	1	2	2	-	1	-	1	-	-	1
<b>BP507P.5</b>	Select the glass containers required for the storage of the finished products.	2	2	2	1	1	1	-	-	-	-	1

*S. H. H. H.*

AMITY UNIVERSITY PHARMACY  
 DIRECTOR & PRINCIPAL  
 Amity University, Mathya Pradesh Gwalior





AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACOGNOSY

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

#### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

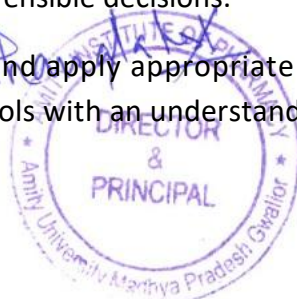
### Programme Outcomes:

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.



**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

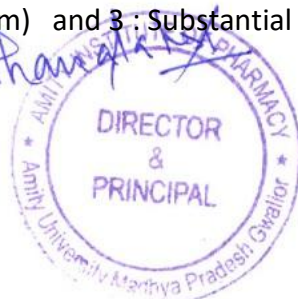
**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3: Substantial (High)

If there is no correlation, put "0"



**PROGRAMME ARTICULATION  
MATRIX**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
V SEM																	
	BP508 P	3	3		3	2	3		2	2	2	2		-	1	-	
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

*H. H. H.*







<b>DEPARTMENT OF PHARMACOLOGY</b>
<b>Course Handout</b>
Course: PHARMACOGNOSY & PHYTOCHEMISTRY II (Practical)
Course Code : BP 508 P, Crédits : 02, Session : 2023-24 (Odd Sem.), Class : B.Pharm. 3 <sup>rd</sup> Year
Faculty Name : Mr. Jamal Basha Dudekula

A. **Introduction:** This lab-based course enables students to apply theoretical knowledge in real-world scenarios, including identifying plant materials, extracting phytochemicals, and performing qualitative and quantitative analysis. Students gain familiarity with various pharmacognostic, microscopic, and phytochemical techniques essential for the study of plant-based drugs.

B. **Course Outcomes:** At the end of the course, students will be able to:

**BP508P 1.** To know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents

**BP508P 2.** To understand the preparation and development of herbal formulation.

**BP508P 3.** To understand the herbal drug interactions

**BP508P 4.** To carryout isolation and identification of phytoconstituents

C. **Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

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**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

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**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

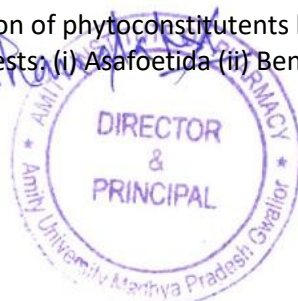
**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**D. Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	10%
	Mid Term 2		
	Lab record	LR	1%
	Viva	V	2%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	2%
End Semester Examination	End Semester Examination	EE	35%
<b>Total</b>			<b>50%</b>

**E. Syllabus**

- Morphology, histology and powder characteristics & extraction & detection of: Cinchona, Cinnamon, Senna, Clove, Ephedra, Fennel and Coriander
- Exercise involving isolation & detection of active principles a. Caffeine - from tea dust. b. Diosgenin from Dioscorea c. Atropine from Belladonna d. Sennosides from Senna
- Separation of sugars by Paper chromatography
- TLC of herbal extract
- Distillation of volatile oils and detection of phytoconstituents by TLC
- Analysis of crude drugs by chemical tests: (i) Asafoetida (ii) Benzoin (iii) Colophony (iv) Aloes (v) Myrrh



**Examination Scheme:**

Components	A	CT	LR	V	EE
Weightage (%)	2	10	1	2	35

CT: Class Test, LR: Lab Record, V: Viva, EE: End Semester Examination; A: Attendance

**F. Suggested Text/Reference Books:**

1. W.C.Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Saunders & Co., London, 2009.
2. Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers & Distribution, New Delhi.
3. Text book of Pharmacognosy by C.K. Kokate, Purohit, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi.
4. Herbal drug industry by R.D. Choudhary (1996), 1st Edn, Eastern Publisher, New Delhi.
5. Essentials of Pharmacognosy, Dr.SH.Ansari, 11nd edition, Birla publications, New Delhi, 2007
6. Herbal Cosmetics by H.Pande, Asia Pacific Business press, Inc, New Delhi.
7. A.N. Kalia, Textbook of Industrial Pharmacognosy, CBS Publishers, New Delhi, 2005.
8. R Endress, Plant cell Biotechnology, Springer-Verlag, Berlin, 1994.
9. Pharmacognosy & Pharmacobiotechnology. James Bobbers, Marilyn KS, VE Tylor.
10. The formulation and preparation of cosmetic, fragrances and flavours.
11. Remington's Pharmaceutical sciences.
12. Text Book of Biotechnology by Vyas and Dixit.

**G. Lecture Plan**

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Morphology, histology and powder characteristics & extraction & detection of: Cinchona, Cinnamon	Practical	1, 5	Mid Term-1, Quiz & End Sem Exam
2	Senna, Clove, Ephedra	Practical	2, 3	Mid Term-1, Quiz & End Sem Exam
3	Fennel and Coriander	Practical	2, 3	Mid Term-1, Quiz & End Sem Exam
4	Exercise involving isolation & detection of active principles a. Caffeine - from tea dust.	Practical	1	Mid Term-1, Quiz & End Sem Exam
5	b. Diosgenin from Dioscorea	Practical	4	Mid Term-1, Quiz & End Sem Exam
6	c. Atropine from Belladonna	Practical	2, 3, 5	Mid Term-1, Quiz & End Sem Exam
7	d. Sennosides from Senna	Practical	1, 4, 5	Mid Term-1, Quiz & End Sem Exam
8	Separation of sugars by Paper chromatography	Practical	1, 5	Mid Term-1, Quiz & End Sem Exam
9	TLC of herbal extract	Practical	4	Mid Term-1, Quiz & End Sem Exam



10	Distillation of volatile oils and detection of phytoconstitutes by TLC	Practical	4	Mid Term-1, Quiz & End Sem Exam
11	Analysis of crude drugs by chemical tests: (i) Asafoetida	Practical	4, 5	Mid Term-1, Quiz & End Sem Exam
12	(ii) Benzoin	Practical	1, 4, 5	Mid Term-1, Quiz & End Sem Exam
13	(iii) Colophony	Practical	1, 4, 5	Mid Term-1, Quiz & End Sem Exam
14	(iv) Aloes	Practical	2, 3	Mid Term-1, Quiz & End Sem Exam
15	(v) Myrrh	Practical	4, 5	Mid Term-1, Quiz & End Sem Exam

#### H. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
<b>BP508P 1.</b>	To know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstitutes	3	3	2	3	-	1	3	2	1	2	2		2	2	2
<b>BP508P 2.</b>	To understand the preparation and development of herbal formulation	3	3	2	2	-	1	2	1	-	2	2		1	2	1
<b>BP508P 3.</b>	To understand the herbal drug interactions	3	1	1	3	-	-	2	1	-	1	1		1	1	-
<b>BP508P 4.</b>	To carryout isolation and identification of phytoconstitutes	3	3	2	3	1	-	2	1	-	2	1		3	3	2

**DIRECTOR & PRINCIPAL**
  
Anuraj Institute of Pharmacy
  
Anuraj University, Madhya Pradesh

### Sample Question Paper

Amity Institute of Pharmacy Department of Pharmacognosy I MID-SEMESTER (SEM –5 <sup>th</sup> 2023-24)						
Class: B.Pharm, Vth Semester						
Subject Name: BP 508 P.Pharmacognosy & Phytochemistry II (Practical)		Time: 4 Hrs			Max. Marks: 40	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1b,1e, 1c	Q.1a,1d	Q.2	Q.2,3		
The student will be able to						
<b>CO1.</b> To know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents						
<b>CO2.</b> To understand the preparation and development of herbal formulation.						
<b>CO3.</b> To understand the herbal drug interactions						
<b>CO4.</b> To carryout isolation and identification of phytoconstituents						
CO Map	Question No.	Question				Marks
CO1,2	Q.1a	Identify and describe the anatomical characteristics of a given medicinal plant tissue under the microscope.				2
CO1,3	Q.1b	Explain the process of maceration, percolation, and Soxhlet extraction for isolating phytoconstituents. Which technique would you use for a plant rich in volatile oils?				2
CO3	Q.1c	Identify alkaloids, flavonoids, tannins, glycosides, and saponins in a given plant extract using chemical tests.				2
CO3	Q.1d	Set up and run a TLC experiment to identify components of a plant extract, such as alkaloids or phenolic compounds				2
CO3,4	Q.1e	Explain the methods used for standardization of crude drugs and determine the foreign organic matter, moisture content, and ash value in a sample.				2
CO3,4,5	Q.2	Experiment Isolate the sennosides from Senna leaves and identify them by TLC				25
CO1,2,3,4,5	Q.3	Viva				5


Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**Attainment Level: 3**

90.6 % of students secured more than 60% marks, so this course PHARMACOGNOSY & PHYTOCHEISTRY II (Practical) (BP508P) attainment is level 3.

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# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

## PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) AND PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

Bachelor of Pharmacy (B. Pharm.) Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

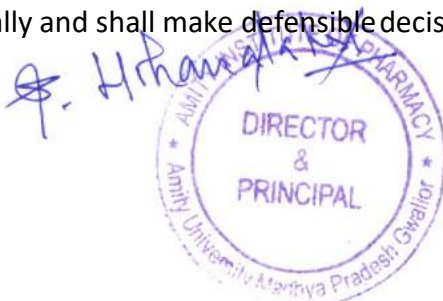
**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### Programme Outcomes (POs):

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.





**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team -building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well- being.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self- assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.



**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

PROGRAMME ARTICULATION MATRIX																
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
VI SEM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	BP601T	3	-	2	-	1	3	2	-	-	-	-	-	1	1	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*[Handwritten Signature]*  
 AMITY UNIVERSITY PHARMACY  
 DIRECTOR & PRINCIPAL  
 Amity University, Madhya Pradesh Gwalior



# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

<b>DEPARTMENT OF PHARMACEUTICAL CHEMISTRY</b>
<b>Course Handout</b>
Course : MEDICINAL CHEMISTRY – III THEORY
Course Code : BP601T, Crédits: 04, Session :2023-24 (Even Sem.), Class : B.Pharm. IIIrd Year
Faculty Name: Mr. Hero Khan Pathan

**A. Introduction:** The course is designed to impart fundamental knowledge on the preparatory pharmacy with arts and science of preparing the different conventional dosage forms.

**B. Course Outcomes:** At the end of the course, students will be able to:

**BP601T.1.** Understand the chemistry of drugs with respect to their pharmacological activity

**BP601T.2.** Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs

**BP601T.3.** Understand the mechanism of action.

**BP601T.4.** Know the Structural Activity Relationship of different class of drugs.

**BP601T.5.** Study the chemical synthesis of selected drugs.

**C. Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.



**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

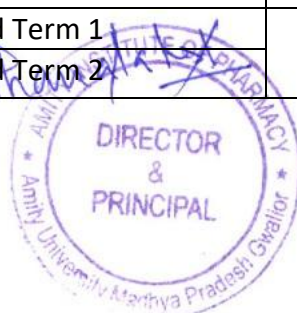
**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**D. Assessment Plan:**

<b>Component of Evaluation</b>	<b>Description</b>	<b>Code</b>	<b>Weightage %</b>
Continuous Internal	Mid Term 1	CT	15%
	Mid Term 2		



Evaluation	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	3%
	Student – Teacher interaction	S-T I	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

## E. Syllabus

### UNIT – I

#### Antibiotics

Historical background, Nomenclature, Stereochemistry, Structure activity relationship, Chemical degradation classification and important products of the following classes.

**β-Lactam antibiotics:** Penicillin, Cephalosporins, β-Lactamase inhibitors, Monobactams

**Aminoglycosides:** Streptomycin, Neomycin, Kanamycin

**Tetracyclines:** Tetracycline, Oxytetracycline, Chlortetracycline, Minocycline, Doxycycline

### UNIT – II

#### Antibiotics

Historical background, Nomenclature, Stereochemistry, Structure activity relationship, Chemical degradation classification and important products of the following classes.

**Macrolide:** Erythromycin, Clarithromycin, Azithromycin.

**Miscellaneous:** Chloramphenicol\*, Clindamycin.

**Prodrugs:** Basic concepts and application of prodrugs design.

**Antimalarials:** Etiology of malaria.

**Quinolines:** SAR, Quinine sulphate, Chloroquine\*, Amodiaquine, Primaquine phosphate, Pamaquine\*, Quinacrine hydrochloride, Mefloquine.

**Biguanides and dihydro triazines:** Cycloguanil pamoate, Proguanil.

**Miscellaneous:** Pyrimethamine, Artesunate, Artemether, Atovaquone



### UNIT – III

#### Anti-tubercular Agents

**Synthetic anti tubercular agents:** Isoniozid\*, Ethionamide, Ethambutol, Pyrazinamide, Para amino salicylic acid.\* Anti tubercular antibiotics: Rifampicin, Rifabutin, Cycloserine, Streptomycine, Capreomycin sulphate.

#### Urinary tract anti-infective agents

Quinolones: SAR of quinolones, Nalidixic Acid, Norfloxacin, Enoxacin, Ciprofloxacin\*, Ofloxacin, Lomefloxacin, Sparfloxacin, Gatifloxacin,

#### Moxifloxacin

**Miscellaneous: Furazolidine, Nitrofurantoin\*, Methanamine.**

#### Antiviral agents:

Amantadine hydrochloride, Rimantadine hydrochloride, Idoxuridine trifluoride, Acyclovir\*, Gancyclovir, Zidovudine, Didanosine, Zalcitabine, Lamivudine, Loviride, Delavirding, Ribavirin, Saquinavir, Indinavir, Ritonavir.

### UNIT – IV

#### Antifungal agents:

**Antifungal antibiotics:** Amphotericin-B, Nystatin, Natamycin, Griseofulvin.

**Synthetic Antifungal agents:** Clotrimazole, Econazole, Butoconazole, Oxiconazole Tioconazole, Miconazole\*, Ketoconazole, Terconazole, Itraconazole, Fluconazole, Naftifine hydrochloride, Tolnaftate\*.

**Anti-Protozoal Agents:** Metronidazole\*, Tinidazole, Ornidazole, Diloxanide, Iodoquinol, Pentamidine Isethionate, Atovaquone, Eflornithine.

**Anthelmintics:** Diethylcarbamazine citrate\*, Thiabendazole, Mebendazole\*, Albendazole, Niclosamide, Oxamniquine, Praziquantal, Ivermectin.

### UNIV – V

#### Introduction to Drug Design

Various approaches used in drug design.

Physicochemical parameters used in quantitative structure activity relationship (QSAR) such as partition coefficient, Hammett's electronic parameter, Taft's steric parameter and Hansch analysis.

Pharmacophore modeling and docking techniques.

**Combinatorial Chemistry:** Concept and applications chemistry: solid phase and solution phase synthesis of combinatoria

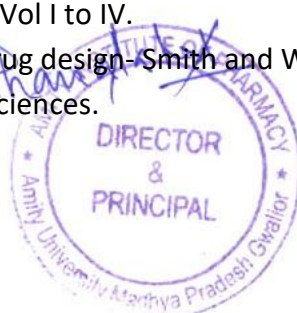
#### F. Examination Scheme:

Components	A	CT	S/V/Q/HA	STI	EE
Weightage (%)	4	15	3	3	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination; A: Attendance

#### G. Suggested Text/Reference Books:

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
2. Foye's Principles of Medicinal Chemistry.
3. Burger's Medicinal Chemistry, Vol I to IV.
4. Introduction to principles of drug design- Smith and Williams.
5. Remington's Pharmaceutical Sciences.



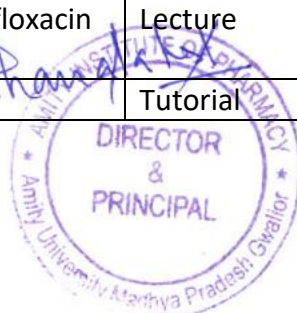
6. Martindale's extra pharmacopoeia.
7. Organic Chemistry by I.L. Finar, Vol. II.
8. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1 to 5.
9. Indian Pharmacopoeia.
10. Text book of practical organic chemistry- A.I.Vogel.

#### H. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	<b>β-Lactam antibiotics:</b> Penicillin	Lecture	1,2,3	Mid Term-1, Quiz & End Sem Exam
2	Cephalosporins,	Lecture	4,5	Mid Term-1, Quiz & End Sem Exam
3	β- Lactamase inhibitors	Lecture	1,2,3	Mid Term-1, Quiz & End Sem Exam
4	Monobactams	Tutorial	1,2,3	Mid Term-1, Quiz & End Sem Exam
5	Aminoglycosides	Lecture	1,2,3	Mid Term-1, Quiz & End Sem Exam
6	Streptomycin,	Lecture	1,2,3	Mid Term-1, Quiz & End Sem Exam
7	Neomycin	Lecture	1,2,3	Mid Term-1, Quiz & End Sem Exam
8	Kanamycin	Tutorial	1,2,3,4	Mid Term-1, Quiz & End Sem Exam
9	Tetracyclines	Lecture	1,2,3	Mid Term-1, Quiz & End Sem Exam
10	Tetracycline	Lecture	1,2,3	Mid Term-1, Quiz & End Sem Exam
11	Oxytetracycline,	Lecture	1,2,3	Mid Term-1, Quiz & End Sem Exam
12	Chlortetracycline,	Tutorial	4, 1,2,3	Mid Term-1, Quiz & End Sem Exam
13	Minocycline, Doxycycline dinitrite	Lecture	1,2,3	Mid Term-1, Quiz & End Sem Exam
14	<b>Macrolide:</b> Erythromycin	Lecture	1,2,3	Mid Term-1, Quiz & End Sem Exam
15	Clarithromycin, Azithromycin.	Lecture	5,1,2,3	Mid Term-1, Quiz & End Sem Exam
16	<b>Prodrugs:</b> Basic concepts	Tutorial	1,2,3	Mid Term-1, Quiz & End Sem Exam
17	Application of prodrugs design.	Lecture	1,2,3	Mid Term-1, Quiz & End Sem Exam

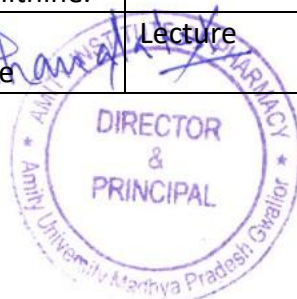


18	<b>Antimalarials:</b> Etiology of malaria.	Lecture	5, 1,2,3	Mid Term-2, Quiz & End Sem Exam
19	<b>Quinolines:</b> SAR,	Lecture	1,2,3	Mid Term-2, Quiz & End Sem Exam
20	Quinine sulphate, Chloroquine*	Tutorial	1,2,3	Mid Term-2, Quiz & End Sem Exam
21	Amodiaquine, Primaquine phosphate, Pamaquine*	Lecture	5, 1,2,3	Mid Term-2, Quiz & End Sem Exam
22	Quinacrine hydrochloride, Mefloquine	Lecture	1,2,3	Mid Term-2, Quiz & End Sem Exam
23	Digoxin, Digitoxin,	Lecture	1,2,3	Mid Term-2, Quiz & End Sem Exam
24	Biguanides and dihydro triazines: Cycloguanil pamoate, Proguanil.	Tutorial	1,2,3	Mid Term-2, Quiz & End Sem Exam
25	<b>Miscellaneous:</b> Pyrimethamine, Artesunate, Artemether, Atovaquone	Lecture	1,2,3	Mid Term-2, Quiz & End Sem Exam
26	<b>Anti-tubercular Agents</b> <b>Synthetic anti tubercular agents:</b>	Lecture	1,2,3	Mid Term-2, Quiz & End Sem Exam
27	Isoniazid*, Ethionamide, Ethambutol, Pyrazinamide,	Lecture	1,2,3	Mid Term-2, Quiz & End Sem Exam
28	Para amino salicylic acid.*	Tutorial	1,2,3	Mid Term-2, Quiz & End Sem Exam
29	<b>Anti tubercular antibiotics:</b> Rifampicin, Rifabutin,	Lecture	1,2,3	Mid Term-1, Quiz & End Sem Exam
30	Cycloserine Streptomycine, Capreomycin sulphate	Lecture	1,2,3	Mid Term-2, Quiz & End Sem Exam
31	<b>Urinary tract anti-infective agents</b>	Lecture	1,2,3	Mid Term-2, Quiz & End Sem Exam
32	<b>Quinolones:</b> SAR of quinolones,	Tutorial	1,2,3	Mid Term-2, Quiz & End Sem Exam
33	Nalidixic Acid, Norfloxacin, Enoxacin, Ciprofloxacin*	Lecture	1,2,3	Mid Term-2, Quiz & End Sem Exam
34	Ofloxacin, Lomefloxacin, Sparfloxacin,	Lecture	1,2,3	Mid Term-2, Quiz & End Sem Exam
35	Gatifloxacin, Moxifloxacin	Lecture	1,2,3	Mid Term-2, Quiz & End Sem Exam
36	<b>Miscellaneous:</b>	Tutorial	1,2,3	Mid Term-2, Quiz





	Furazolidine, Nitrofurantoin*, Methanamine			& End Sem Exam
37	<b>Antiviral agents:</b> Amantadine hydrochloride,	Lecture	5, 1,2,3	Mid Term-2, Quiz & End Sem Exam
38	Idoxuridine trifluoride, Acyclovir*, Gancyclovir,	Lecture	1,2,3	Mid Term-2, Quiz & End Sem Exam
39	Rimantadine hydrochloride, Zidovudine, Didanosine, Zalcitabine.	Lecture	1,2,3	Mid Term-2, Quiz & End Sem Exam
40	Lamivudine, Loviride, Delavirding	Tutorial	1,2,3	Mid Term-2, Quiz & End Sem Exam
41	Ribavirin, Saquinavir, Indinavir, Ritonavir.	Lecture	1,2,3	Mid Term-2, Quiz & End Sem Exam
42	<b>Antifungal agents:</b>	Lecture	1,2,3	Mid Term-2, Quiz & End Sem Exam
43	<b>Antifungal antibiotics:</b> Amphotericin-B, Nystatin, Natamycin, Griseofulvin.	Lecture	1,2,3	Mid Term-2, Quiz & End Sem Exam
44	<b>Sulphonamides and Sulfones</b>	Tutorial	5	Mid Term-2, Quiz & End Sem Exam
45	<b>Synthetic Antifungal agents:</b> Clotrimazole, Econazole, Butoconazole, Oxiconazole Tioconazole,	Lecture	1,2,3	Mid Term-2, Quiz & End Sem Exam
46	Miconazole*, Ketoconazole, Terconazole, Itraconazole	Lecture	1,2,3	Mid Term-2, Quiz & End Sem Exam
47	Fluconazole, Naftifine hydrochloride, Tolnaftate*.	Lecture	1,2,3	Quiz & End Sem Exam
48	<b>Anti-protozoal Agents:</b> Metronidazole*, Tinidazole, Ornidazole, Diloxanide, Iodoquinol,	Tutorial	1,2,3	Quiz & End Sem Exam
49	Pentamidine Isethionate, Atovaquone, Eflornithine.	Lecture	1,2,3	Quiz & End Sem Exam
50	<b>Anthelmintics:</b> Diethylcarbamazine	Lecture	5	Quiz & End Sem Exam



	citrate*, Thiabendazole, Mebendazole*,			
51	Albendazole, Niclosamide, Oxamniquine, Praziquantal, Ivermectin.	Lecture	5	Quiz & End Sem Exam
52	Historical development, chemistry, Sulfasalazine.	Tutorial	1,2,3	Quiz & End Sem Exam
53	classification and SAR of Sulfonamides:	Lecture	1,2,3	Quiz & End Sem Exam
54	<b>Folate reductase inhibitors:</b> Trimethoprim*, Cotrimoxazole. <b>Sulfones:</b> Dapsone*., Sulfisoxazole, Sulphamethizine, Sulfacetamide*,	Lecture	1,2,3	Quiz & End Sem Exam
55	Sulphapyridine, Sulfamethoxazole*, Sulphadiazine, Mefenide acetate,	Lecture	1,2,3	Quiz & End Sem Exam
56	<b>Introduction to Drug Design</b> Various approaches used in drug design.	Tutorial	1,2,3	Quiz & End Sem Exam
57	Physicochemical parameters used in quantitative structure activity relationship (QSAR) such as partition coefficient, Hammett's electronic parameter,	Lecture	1,2,3	Quiz & End Sem Exam
58	Taft's steric parameter and Hansch analysis.	Lecture	1,2,3	Quiz & End Sem Exam
59	Pharmacophore modeling and docking techniques.	Lecture	5	Quiz & End Sem Exam
60	<i>Combinatorial Chemistry: Concept and applications chemistry: solid phase and solution phase synthesis.</i>	Tutorial	5	Quiz & End Sem Exam



**I. Course Articulation Matrix (Mapping of COs with POs)**

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
<b>BP601T.1</b>	<b>BP601T.1.</b> Understand the chemistry of drugs with respect to their pharmacological activity	3	-	-	-	2	2	1	-	1	-	-	-	1	-	-
<b>BP601T.2.</b>	<b>BP601T.2.</b> Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs	3	-	-	1	-	2	-	-	-	-	-	3	-	-	-
<b>BP601T.3.</b>	<b>BP601T.3.</b> Understand the mechanism of action.	3	2	-	3	-	2	-	-	-	-	-	3	-	2	-
<b>BP601T.4.</b>	<b>BP601T.4.</b> Know the Structural Activity Relationship of different class of drugs.	2	2	3	3	-	1	-	-	-	-	-	3	-	-	-
<b>BP601T.5.</b>	<b>BP601T.5.</b> Study the chemical synthesis of selected drugs.	1	-	3	-	-	-	-	-	-	-	-	3	-	-	-


### Sample Question Paper

Amity Institute of Pharmacy Department of Pharmaceutical Chemistry I MID-SEMESTER (SEM –VI) 2023-24						
Class: B.Pharm, VI Semester						
Subject Name: BP601T. MEDICINAL CHEMISTRY – III (Theory)		Time: 1 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,3,4,5	Q.6,8,9	Q.2	Q.7, 10		
The student will be able to <b>CO1. Understand the chemistry of drugs with respect to their pharmacological activity</b> <b>CO2. Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs</b> <b>CO3. Understand the mechanism of action.</b> <b>CO.4. Know the Structural Activity Relationship of different class of drugs.</b> <b>CO.5. Study the chemical synthesis of selected drugs.</b>						
CO Map	Question No.	Question				Marks
CO4	Q.1	How does Streptomycin protect against infections?				2
CO5	Q.2	Write the mechanism of action of Quinine.				2
CO1	Q.3	Define Tetracyclines with two suitable drug structural examples.				2
CO2	Q.4	Write the synthetic route chemical reaction of Chloramphenicol				2
CO2	Q.5	Write the chemical structural difference between Chloroquine and Amodiaquine,				2
CO1	Q.6	What are antimalarial drugs? Explain the life cycle of malaria.				10

*S. H. H. H.*  
DIRECTOR & PRINCIPAL  
Amity Institute of Pharmacy  
Amity University, Madhya Pradesh  
Gwalior

CO4	Q.7	Discuss about the classification and mechanism of synthetic antifungal agents along with suitable chemical structural examples.	10
CO3	Q.8	Write short notes on Sulphonamides and Sulfones.	5
CO2	Q.9	Classify $\beta$ -lactam antibiotics.	5
CO4	Q.10	Write short notes on Anti-tubercular Agents.	5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**No Attainment Level:**

46.7 % Percentage of students secured more than 60% marks, so this course MEDICINAL CHEMISTRY III – THEORY (BP601T) not attained Level.





AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACOLOGY

## PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) AND PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

Bachelor of Pharmacy (B. Pharm.) Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

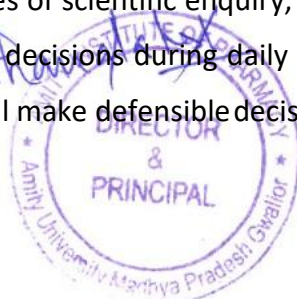
**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### Programme Outcomes (POs):

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.



**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team -building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well- being.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self- assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.



**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

PROGRAMME ARTICULATION MATRIX																
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
VI SEM																
	BP602T	3	3	3	3	2	2	3	1	1	3	1				

*[Handwritten Signature]*  






# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

<b>DEPARTMENT OF PHARMACOLOGY</b>
<b>Course Handout</b>
Course : Pharmacology-III (Theory)
Course Code : BP602T, Crédits : 04, Session : 2023-24 (Even Sem.), Class : B. Pharm. 3rd Year
Faculty Name : Mandeep Kumar Singh

**A. Introduction:** This subject is intended to impart the fundamental knowledge on various aspects (classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications) of drugs acting on different systems of body and in addition, emphasis the basic concepts of bioassay.:

1. Know the classification of the drugs
2. Understand the mechanism of action, therapeutic uses, clinical uses and side effects of the drugs
3. Know the importance of bio-assays in preclinical drug discovery
4. Understand the pharmacology of drugs act on CVS, autacoids, coagulation, hormones etc.

**B. Course Outcomes:** At the end of the course, students will be able to:

**BP602T.1.** Discuss the Pharmacology of the drugs affecting the Respiratory and GIT system.

**BP602T.2.** Explain the pharmacology of chemotherapeutic agents

**BP602T.3.** Explain the pharmacology of mechanism of chemotherapeutic agents.

**BP602T.4.** Explain the pharmacology of immunopharmacological agents.

**BP602T.5** Describe the various methods and applications of bioassay.

**C. Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Posses knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.



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**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self- assessment and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.



#### D. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	A minimum of 80% attendance is required to be maintained by a student to be qualified for taking up the Odd Semester examination	A	4 %
	Quiz/ Assignment/Open book test/ Field work/Group discussion/ Seminar	Q/A/OBT/FW/GD/S	3%
	Student – Teacher interaction	STA	3%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

Q: Quiz, A: Assignment, OBT: Open book test, FW: Field work, GD: Group discussion, S: Seminar



### E. Syllabus

UNIT-I 10hours 1. Pharmacology of drugs acting on Respiratory system a. Anti -asthmatic drugs b. Drugs used in the management of COPD c. Expectorants and antitussives d. Nasal decongestants e. Respiratory stimulants 2. Pharmacology of drugs acting on the Gastrointestinal Tract a. Antiulcer agents. b. Drugs for constipation and diarrhoea. c. Appetite stimulants and suppressants. d. Digestants and carminatives. e. Emetics and anti-emetics.

UNIT-II 10hours 3. Chemotherapy a. General principles of chemotherapy. b. Sulfonamides and cotrimoxazole. c. Antibiotics- Penicillins, cephalosporins, chloramphenicol, macrolides, quinolones and fluoroquinolins, tetracycline and aminoglycosides

UNIT-III 10hours 3. Chemotherapy a. Antitubercular agents b. Antileprotic agents 131 c. Antifungal agents d. Antiviral drugs e. Anthelmintics f. Antimalarial drugs g. Antiamoebic agents

UNIT-IV 08hours 3. Chemotherapy l. Urinary tract infections and sexually transmitted diseases. m. Chemotherapy of malignancy. 4. Immunopharmacology a. Immunostimulants b. Immunosuppressant Protein drugs, monoclonal antibodies, target drugs to antigen, biosimilars

UNIT-V 07hours 5. Principles of toxicology a. Definition and basic knowledge of acute, subacute and chronic toxicity. b. Definition and basic knowledge of genotoxicity, carcinogenicity, teratogenicity and mutagenicity c. General principles of treatment of poisoning d. Clinical symptoms and management of barbiturates, morphine, organophosphorus compound and lead, mercury and arsenic poisoning. 6. Chronopharmacology a. Definition of rhythm and cycles. b. Biological clock and their significance leading to chronotherapy

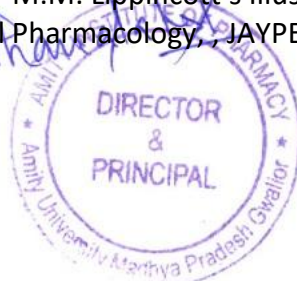
### F. Examination Scheme:

Components	CT	A	Q/A/OBT/FW/GD/S	STI	EE
Weightage (%)	15	4	3	3	75

Q: Quiz, A: Assignment, OBT: Open book test, FW: Field work, GD: Group discussion, S: Seminar, STI: Student – Teacher interaction

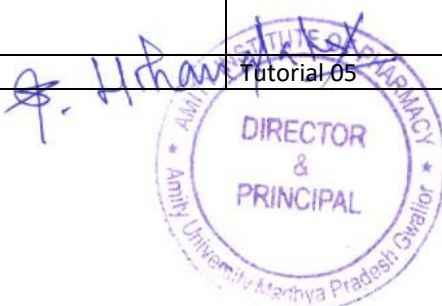
### G. Suggested Text/Reference Books:

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchill Livingstone Elsevier
2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill.
3. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
4. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs, The Point Lippincott Williams & Wilkins.
5. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews Pharmacology.
6. K.D.Tripathi. Essentials of Medical Pharmacology, JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi

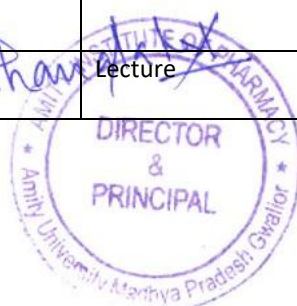


## H. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1.	Pharmacology of drugs acting on Respiratory system	Lecture	BP602T.1	Mid Term-1, Quiz & End Sem Exam
2.	Anti -asthmatic drugs	Lecture	BP602T.1	Mid Term-1, Quiz & End Sem Exam
3.	Drugs used in the management of COPD	Lecture	BP602T.1	Mid Term-1, Quiz & End Sem Exam
4.	Tutorial 01	Tutorial 01		
5.	Expectorants and antitussives	Lecture	BP602T.1	Mid Term-1, Quiz & End Sem Exam
6.	Nasal decongestants	Lecture	BP602T.1	Mid Term-1, Quiz & End Sem Exam
7.	Drugs for constipation and diarrhoea	Lecture	BP602T.1	Mid Term-1, Quiz & End Sem Exam
8.	Tutorial 02	Tutorial 02		
9.	Respiratory stimulants, Emetics and anti-emetics.	Lecture	BP602T.1	Mid Term-1, Quiz & End Sem Exam
10.	Appetite stimulants and suppressants	Lecture	BP602T.1	Mid Term-1, Quiz & End Sem Exam
11.	Antiulcer agents, Appetite stimulants and suppressants	Lecture	BP602T.1	Mid Term-1, Quiz & End Sem Exam
12.	Tutorial 03	Tutorial 04		
13.	General principles of chemotherapy	Lecture	BP602T.2	Mid Term-1, Quiz & End Sem Exam
14.	Sulfonamides	Lecture	BP602T.2	Mid Term-1, Quiz & End Sem Exam
15.	cotrimoxazole	Lecture	BP602T.2	Mid Term-1, Quiz & End Sem Exam
16.	Tutorial 04	Tutorial 04		
17.	Antibiotics- Penicillins	Lecture	BP602T.2	Mid Term-1, Quiz & End Sem Exam
18.	cephalosporins	Lecture	BP602T.2	Mid Term-1, Quiz & End Sem Exam
19.	chloramphenicol	Lecture	BP602T.2	Mid Term-1, Quiz & End Sem Exam
20.	Tutorial 05	Tutorial 05		



21.	macrolides	Lecture	BP602T.2	Mid Term-1, Quiz & End Sem Exam
22.	quinolones	Lecture	BP602T.2	Mid Term-1, Quiz & End Sem Exam
23.	fluoroquinolins	Lecture	BP602T.2	Mid Term-1, Quiz & End Sem Exam
24.	Tutorial 06	Tutorial 06		
25.	tetracycline	Lecture	BP602T.2	Mid Term-1, Quiz & End Sem Exam
26.	aminoglycosides	Lecture	BP602T.3	Mid Term-1, Quiz & End Sem Exam
27.	Chemotherapy a. Antitubercular agents	Lecture	BP602T.3	Mid Term-1, Quiz & End Sem Exam
28.	Tutorial 07	Tutorial 07		
29.	Antifungal agents	Lecture	BP602T.3	Mid Term-1, Quiz & End Sem Exam
30.	Antiviral drugs	Lecture	BP602T.3	Mid Term-1, Quiz & End Sem Exam
31.	Anthelmintics	Lecture	BP602T.3	Mid Term-1, Quiz & End Sem Exam
32.	Tutorial 08	Tutorial 08		
33.	Antimalarial drugs	Lecture	BP602T.3	Mid Term-1, Quiz & End Sem Exam
34.	Antiamoebic agents	Lecture	BP602T.3	Mid Term-2, Quiz & End Sem Exam
35.	Antiamoebic agents	Lecture	BP602T.3	Mid Term-2, Quiz & End Sem Exam
36.	Tutorial 09	Tutorial 09		
37.	Chemotherapy	Lecture	BP602T.4	Mid Term-2, Quiz & End Sem Exam
38.	Urinary tract infections	Lecture	BP602T.4	Mid Term-2, Quiz & End Sem Exam
39.	sexually transmitted diseases	Lecture	BP602T.4	Mid Term-2, Quiz & End Sem Exam
40.	Tutorial 10	Tutorial 10		
41.	Chemotherapy of malignancy	Lecture	BP602T.4	Mid Term-2, Quiz & End Sem Exam
42.	Immunopharmacology	Lecture	BP602T.4	Mid Term-2, Quiz & End Sem Exam



				Exam
43.	Immunostimulants	Lecture	BP602T.4	Mid Term-2, Quiz & End Sem Exam
44.	Tutorial 11	Tutorial 11		
45.	Immunosuppressant	Lecture	BP602T.4	Mid Term-2, Quiz & End Sem Exam
46.	Protein drugs, monoclonal antibodies	Lecture	BP602T.4	Mid Term-2, Quiz & End Sem Exam
47.	Target drugs to antigen, biosimilars	Lecture	BP602T.4	Mid Term-2, Quiz & End Sem Exam
48.	Tutorial 12	Tutorial 12		
49.	Principles of toxicology	Lecture	BP602T.5	Mid Term-2, Quiz & End Sem Exam
50.	Definition and basic knowledge of acute, subacute and chronic toxicity	Lecture	BP602T.5	Mid Term-2, Quiz & End Sem Exam
51.	Definition and basic knowledge of genotoxicity, carcinogenicity, teratogenicity and mutagenicity	Lecture	BP602T.5	Mid Term-2, Quiz & End Sem Exam
52.	Tutorial 13	Tutorial 13		
53.	General principles of treatment of poisoning	Lecture	BP602T.5	Mid Term-2, Quiz & End Sem Exam
54.	Clinical symptoms and management of barbiturates	Lecture	BP602T.5	Mid Term-2, Quiz & End Sem Exam
55.	Principles and applications of Bioassay, Types of bioassays	Lecture	BP602T.5	Mid Term-2, Quiz & End Sem Exam
56.	Tutorial 14	Tutorial 14		
57.	Organophosphorus compound and lead, mercury and arsenic poisoning	Lecture	BP602T.5	Mid Term-2, Quiz & End Sem Exam
58.	Chronopharmacology a. Definition of rhythm and cycles	Lecture	BP602T.5	Mid Term-2, Quiz & End Sem Exam
59.	Definition of rhythm and cycles. b. Biological clock and their significance leading to chronotherapy	Lecture	BP602T.5	Mid Term-2, Quiz & End Sem Exam
60.	Tutorial 15	Tutorial 15		Mid Term-2, Quiz & End Sem Exam



### I. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES										
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11
BP602T.1	Discuss the drugs acting on the various disorders of Respiratory and GIT system	2	2	3	2	-	1	2	1	-	-	1
BP602T.2	Explain the pharmacology of chemotherapeutic agents	2	2	2	3	-	1	1	1	-	-	1
BP602T.3	Explain the pharmacology of mechanism of chemotherapeutic agents	2	1	1	-	-	1	3	2	-	-	-
BP602T.4	Explain the pharmacology of immunopharmacological agents.	2	2	2	1	-	1	-	-	-	-	-
BP602T.5	Explain the mechanism of action and Pharmacology of Toxicological drugs acting on system	2	1	-	-	-	2	1	1	-	-	1





### Sample Question Paper

<b>Amity School of Pharmacy</b> <b>Department of Pharmacology</b> <b>I MID-SEMESTER(SEM-VI) 2023-24</b>						
Class: B. Pharm. VI Semester						
Subject Name: BP602T Pharmacology-III		Time:1 Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		
CO Map	Question No.	Question				Marks
CO1	Q.1	Define Demulcents, Expectorant and Antitussives with examples.				2
CO1	Q.2	Define Cross resistance with example.				2
	Q.3	Categorizes the following AMAs in Narrow-spectrum and Broad spectrum- Penicillins, cephalosporins, chloramphenicol, tetracycline, and aminoglycosides.				2
	Q.4	Enlist the drugs used as Appetite stimulants.				2
	Q.5	Explain the mechanism of action of tetracycline.				2
CO1	Q.6	Classify Anti -asthmatic drugs. Give complete pharmacology of salbutamol.				10
CO2	Q.7	Classify Semisynthetic penicillin with example. Explain Mechanism of action, Spectrum of activity, ADRs and Uses of aminopenicillins.				10
CO2	Q.8	Classify Antiulcer agents. Explain complete pharmacology of PPIs.				5
	Q.9	Classify cephalosporins. Explain Mechanism of action, Spectrum of activity, ADRs and Uses of cephalosporins.				5
CO2	Q.10	Explain problems that arise with the use of AMAs.				5



Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**No Attainment Level:**

44.2 % Percentage of students secured more than 60% marks, so this course PHARMACOLOGY III – THEORY (BP602T) not attained Level.





# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACOLOGY

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### Programme Outcomes:

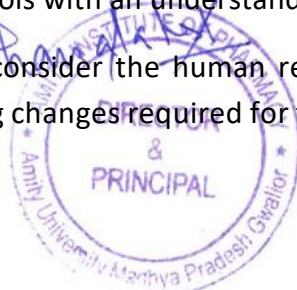
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#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “-”



**PROGRAMME ARTICULATION  
MATRIX**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
VI SEM																	
	BP603T	3	1	1	1	3	2	2	2	2	3	2		3	2	1	
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-




<b>DEPARTMENT OF PHARMACONOSY</b>
<b>Course Handout</b>
Course : HERBAL DRUG TECHNOLOGY – THEORY
Course Code : BP603T Crédits : 04, Session :2023-24 (Even Sem.), Class : B.Pharm. 3rd Year
Faculty Name: Dr. Narender Kumar

**A. Introduction:** It provides students with comprehensive knowledge about the formulation, standardization, and regulatory aspects of herbal medicines. The subject emphasizes the scientific validation of traditional herbal remedies, ensuring quality control, safety, and efficacy in the development of herbal pharmaceuticals.

**B. Course Outcomes:** At the end of the course, students will be able to:

**BP603T.1.** Understand raw material as source of herbal drugs from cultivation to herbal drug product.

**BP603T.2.** Know the WHO and ICH guidelines for evaluation of Herbal drugs

**BP603T.3.** Know the herbal cosmetics, natural sweeteners, nutraceuticals.

**BP603T.4.** Appreciate patenting of herbal drugs, GMP.

**BP603T.5.** The knowledge of basic understanding of herbal drug industry

**C. Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).



**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### D. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	3%
	Student – Teacher interaction	STI	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

#### E. Syllabus

##### UNIT – I

##### Herbs as raw materials

Definition of herb, herbal medicine, herbal medicinal product, herbal drug preparation

Source of Herbs

Selection, identification and authentication of herbal materials

Processing of herbal raw material

Biodynamic Agriculture



Good agricultural practices in cultivation of medicinal plants including Organic farming. Pest and Pest management in medicinal plants: Biopesticides/Bioinsecticides.

Indian Systems of Medicine

a) Basic principles involved in Ayurveda, Siddha, Unani and Homeopathy

b) Preparation and standardization of Ayurvedic formulations viz Aristas and Asawas, Ghutika, Churna, Lehya and Bhasma.

#### **UNIT – II Nutraceuticals**

General aspects, Market, growth, scope and types of products available in the market. Health benefits and role of Nutraceuticals in ailments like Diabetes, CVS diseases, Cancer, Irritable bowel syndrome and various Gastro intestinal diseases. Study of following herbs as health food: Alfaalfa, Chicory, Ginger, Fenugreek, Garlic, Honey, Amla, Ginseng, Ashwagandha, Spirulina  
Herbal-Drug and Herb-Food Interactions: General introduction to interaction and classification. Study of following drugs and their possible side effects and interactions: Hypercium, kava-kava, Ginkobiloba, Ginseng, Garlic, Pepper & Ephedra

#### **UNIT – III Herbal Cosmetics**

Sources and description of raw materials of herbal origin used via, fixed oils, waxes, gums agents colours, perfumes, protective, bleaching agents, antioxidants in products such as skin care, hair care and oral hygiene products. Herbal excipients:

Herbal Excipients – Significance of substances of natural origin as excipients – colorants, sweeteners, binders, diluents, viscosity builders, disintegrants, flavors & perfumes. Herbal formulations : Conventional herbal formulations like syrups, mixtures and tablets and Novel dosage forms like phytosomes

#### **UNIT – IV Evaluation of Drugs**

WHO & ICH guidelines for the assessment of herbal drugs

Stability testing of herbal drugs. Patenting and Regulatory requirements of natural products:

a) Definition of the terms: Patent, IPR, Farmers right, Breeder's right, Bioprospecting and Biopiracy

b) Patenting aspects of Traditional Knowledge and Natural Products. Case study of Curcuma & Neem.

Regulatory Issues - Regulations in India (ASU DTAB, ASU DCC), Regulation of manufacture of ASU drugs - Schedule Z of Drugs & Cosmetics Act for ASU drugs.

#### **UNIT – V General Introduction to Herbal Industry**

Herbal drugs industry: Present scope and future prospects. A brief account of plant based industries and institutions involved in work on medicinal and

aromatic plants in India. Schedule T – Good Manufacturing Practice of Indian systems of medicine

Components of GMP (Schedule – T) and its objectives

Infrastructural requirements, working space, storage area, machinery and equipments,

F. standard operating procedures, health and hygiene, documentation and records

#### **G. Examination Scheme:**

Components	A	CT	S/V/Q/HA	STI	EE
Weightage (%)	4	15	3	3	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination; A: Attendance





**H. Suggested Text/Reference Books:**

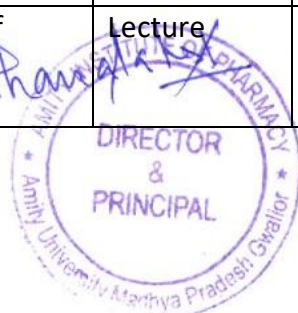
- 1 Textbook of Pharmacognosy by Trease & Evans.
2. Textbook of Pharmacognosy by Tyler, Brady & Robber.
3. Pharmacognosy by Kokate, Purohit and Gokhale
4. Essential of Pharmacognosy by Dr.S.H.Ansari
5. Pharmacognosy & Phytochemistry by V.D.Rangari
6. Pharmacopoeal standards for Ayurvedic Formulation (Council of Research in Indian Medicine & Homeopathy)
7. Mukherjee, P.W. Quality Control of Herbal Drugs: An Approach to Evaluation of Botanicals. Business Horizons Publishers, New Delhi, India, 2002.

**I. Lecture Plan**

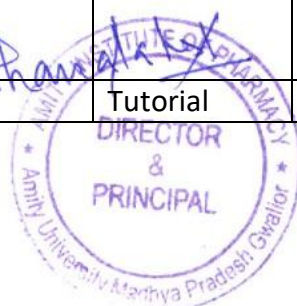
Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Definition of herb, herbal medicine	Lecture	1	Mid Term-1, Quiz & End Sem Exam
2	Herbal medicinal product, herbal drug preparation	Lecture	1	Mid Term-1, Quiz & End Sem Exam
3	Identification and authentication of herbal materials, Source of Herbs	Lecture	1,5	Mid Term-1, Quiz & End Sem Exam
4	Quiz	Tutorial		Mid Term-1, Quiz & End Sem Exam
5	Processing of herbal raw material	Lecture	1	Mid Term-1, Quiz & End Sem Exam
6	Biodynamic Agriculture	Lecture	1	Mid Term-1, Quiz & End Sem Exam
7	Good agricultural practices in cultivation of medicinal plants including Organic farming.	Lecture	1	Mid Term-1, Quiz & End Sem Exam
8	Quiz	Tutorial		Mid Term-1, Quiz & End Sem Exam
9	Pest and Pest management in medicinal plants: Biopesticides/Bioinsecticides.	Lecture	1	Mid Term-1, Quiz & End Sem Exam
10	Indian Systems of Medicine Basic principles involved in Ayurveda, Siddha, Unani and Homeopathy	Lecture	1	Mid Term-1, Quiz & End Sem Exam
11	Preparation and standardization of Ayurvedic formulations viz Aristas and Asawas,	Lecture	1	Mid Term-1, Quiz & End Sem Exam



	Ghutika, Churna, Lehya and Bhasma			
12	Seminar	Tutorial		Mid Term-1, Quiz & End Sem Exam
13	Nutraceuticals General aspects	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
14	Market, growth, scope and types of products available in the market.	Lecture	1,5	Mid Term-1, Quiz & End Sem Exam
15	Health benefits and role of Nutraceuticals in ailments like Diabetes, CVS diseases, Cancer	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
16	Unit test	Tutorial		Mid Term-1, Quiz & End Sem Exam
17	Role of Nutraceuticals in Irritable bowel syndrome and various Gastro intestinal diseases	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
18	Alfaalfa, Chicory	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
19	Fenugreek, Garlic	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
20	Group discussion on different topics	Tutorial		Mid Term-1, Quiz & End Sem Exam
21	Ginger, Honey	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
22	Amla, Ginseng	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
23	Ashwagandha, Spirulina	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
24	Quiz	Tutorial		Mid Term-1, Quiz & End Sem Exam
25	Herbal-Drug and Herb-Food Interactions: General introduction to interaction and classification	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
26	Hypercium, kava-kava	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
27	Ginkobiloba, Ginseng	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
28	Unit Test	Tutorial		Mid Term-1, Quiz & End Sem Exam
29	Pepper & Ephedra	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
30	Ginseng, Garlic	Lecture	1,3	Mid Term-1, Quiz & End Sem Exam
31	Sources and description of raw materials of herbal origin used via, fixed oils,	Lecture	1,3	Mid Term-2, Quiz & End Sem Exam



	waxes			
32	Group discussion on herbal drug interactions	Tutorial		Mid Term-2, Quiz & End Sem Exam
33	Gums agents, colours, perfumes	Lecture	1,3	Mid Term-2, Quiz & End Sem Exam
34	Protective, bleaching agents, antioxidants	Lecture	1,,3	Mid Term-2, Quiz & End Sem Exam
35	Herbal Excipients – Significance of substances of natural origin as excipients	Lecture	3	Mid Term-2, Quiz & End Sem Exam
36	Seminar	Tutorial		Mid Term-2, Quiz & End Sem Exam
37	Colorants, sweeteners, binders	Lecture	3	Mid Term-2, Quiz & End Sem Exam
38	Diluents, viscosity builders, disintegrants	Lecture	3	Mid Term-2, Quiz & End Sem Exam
39	Flavours & perfumes.	Lecture	3	Mid Term-2, Quiz & End Sem Exam
40	Unit test	Tutorial		Mid Term-2, Quiz & End Sem Exam
41	Herbal formulations : Conventional herbal formulations like syrups, mixtures and tablets	Lecture	5	Mid Term-2, Quiz & End Sem Exam
42	Novel dosage forms like phytosomes	Lecture	5	Mid Term-2, Quiz & End Sem Exam
43	Evaluation of Drugs WHO & ICH guidelines for the assessment of herbal drugs	Lecture	2	Mid Term-2, Quiz & End Sem Exam
44	Seminar	Tutorial		Mid Term-2, Quiz & End Sem Exam
45	Stability testing of herbal drugs. Patenting and Regulatory requirements of natural products	Lecture	2,4	Mid Term-2, Quiz & End Sem Exam
46	Definition of the terms: Patent, IPR, Farmers right, Breeder's right, Bioprospecting and Biopiracy	Lecture	4	Mid Term-2, Quiz & End Sem Exam
47	Patenting aspects of Traditional Knowledge and Natural Products. Case study of Curcuma & Neem.	Lecture	4	Quiz & End Sem Exam
48	Quiz	Tutorial		Quiz & End Sem



				Exam
49	Regulatory Issues - Regulations in India (ASU DTAB, ASU DCC), Regulation of manufacture of ASU drugs - Schedule Z of Drugs & Cosmetics Act for ASU drugs.	Lecture	2,3	Quiz & End Sem Exam
50	General Introduction to Herbal Industry	Lecture	5	Quiz & End Sem Exam
51	A brief account of plant based industries and institutions	Lecture	5	Quiz & End Sem Exam
52	Group discussion on Regulatory issues	Tutorial	4,5	Quiz & End Sem Exam
53	Schedule T – Good Manufacturing Practice of Indian systems of medicine	Lecture	4	Quiz & End Sem Exam
54	Components of GMP (Schedule – T) and its objectives	Lecture	4,5	Quiz & End Sem Exam
55	Infrastructural requirements	Lecture	4,5	Quiz & End Sem Exam
56	Unit test	Tutorial		Quiz & End Sem Exam
57	Working space, storage area	Lecture	4,5	Quiz & End Sem Exam
58	Machinery and equipments	Lecture	4,5	Quiz & End Sem Exam
59	Herbal drugs industry: Present scope and future prospects	Lecture	4,5	Quiz & End Sem Exam
60	Unit test	Tutorial		Quiz & End Sem Exam

*A. H. Hanumanth*

AMITY UNIVERSITY OF PHARMACY  
 DIRECTOR & PRINCIPAL  
 Amity University, Madhya Pradesh Gwalior

**J. Course Articulation Matrix (Mapping of COs with POs)**

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
<b>BP603T.1</b>	<b>BP603T.1.</b> Understand raw material as source of herbal drugs from cultivation to herbal drug product.	3	-	-	-	2	2	-	-	3	-	3		2	1	1
<b>BP603T.2.</b>	<b>BP603T.2.</b> Know the WHO and ICH guidelines for evaluation of Herbal drugs	3	-	-	1	-	2	-	-	3	-	3		-	-	3
<b>BP603T.3.</b>	<b>BP603T.3.</b> Know the herbal cosmetics,natural sweeteners,nutraceuticals	3	2	-	3	-	2	-	-	2	-	3		2	1	-
<b>BP603T.4.</b>	<b>BP603T.4.</b> Appreciate patenting of herbal drugs,GMP.	2	2	3	3	-	1	-	2	2	-	3		1	1	3
<b>BP603T.5.</b>	<b>BP603T.5.</b> The knowledge of basic understanding of herbal drug industry	1	-	3	-	-	-	-	-	-	-	3		2	2	2

*A. H. H. H.*  


**Sample Question Paper**

Amity Institute of Pharmacy Department of Pharmacognosy I MID-SEMESTER (SEM –6 <sup>th</sup> ) 2023-24						
Class: B.Pharm, 6thSemester						
Subject Name: BP603T Herbal Drug Technology Theory		Time: 1 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,3,4,5	Q.6,8,9	Q.2	Q.7, 10		
<p>The student will be able to</p> <p><b>CO1.</b> Understand raw material as source of herbal drugs from cultivation to herbal drug product.</p> <p><b>CO2.</b> Know the WHO and ICH guidelines for evaluation of Herbal drugs.</p> <p><b>CO3.</b> Know the herbal cosmetics, natural sweeteners, nutraceuticals.</p> <p><b>CO4.</b> Appreciate patenting of herbal drugs, GMP.</p> <p><b>CO5.</b> The knowledge of basic understanding of herbal drug industry.</p>						
CO Map	Question No.	Question				Marks
CO4	Q.1	Define herbal material and herbal drug preparation.				2
CO5	Q.2	What do you understand by drug interaction, enlist the type of drug interaction as per Ayurveda				2
CO1	Q.3	What is the basic principle involved in homoeopathy?				2
CO2	Q.4	Enlist two nutraceuticals used in gastrointestinal diseases with their active constituents.				2
CO3	Q.5	Write any two plant-based bioinsecticides and their biological source.				2
CO1	Q.6	Mention various Ayurvedic formulations and elaborate the formulation of Asava and its alcoholic content determination.				10
CO4	Q.7	Explain different pest management methods used in the cultivation of medicinal plants.				10
CO3	Q.8	Explain Good agricultural practices in cultivation of medicinal plants including organic farming.				5
CO2	Q.9	Discuss the Health benefits and role of Nutraceuticals in the prevention of cardiovascular disease.				5
CO4	Q.10	Write a detailed note on various sources of herbs with suitable examples.				5



Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**No Attainment Level:**

54.7 % Percentage of students secured more than 60% marks, so this course HERBAL DRUG TECHNOLOGY – THEORY (BP603T) not attained Level.

*H. H. H. H.*



*[Handwritten Signature]*







**AMITY UNIVERSITY MADHYA PRADESH, GWALIOR**

**AMITY INSTITUTE OF PHARMACY**

**DEPARTMENT OF PHARMACEUTICS**

## **PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES**

### **PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)**

#### **Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24**

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

#### **Programme Outcomes:**

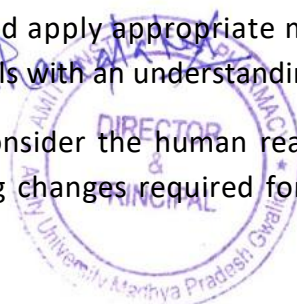
**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional



and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “-”



**PROGRAMME ARTICULATION  
MATRIX**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
VISE M																
	BP604T	3	-	3	2	-	-	2	1	1	2	2	-	3	2	-





# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

## DEPARTMENT OF PHARMACY

### Course Handout

Course : BIOPHARMACEUTICS AND PHARMACOKINETICS

Course Code : BP604T, Programme : III.B. Pharmacy VI-Semester  
Crédits : 04, Session :2023-24 (Even Sem.)

Faculty Name : Dr. M.Prathap

**A. Scope:** This subject is designed to impart knowledge and skills of Biopharmaceutics and pharmacokinetics and their applications in pharmaceutical development, design of dose and dosage regimen and in solving the problems raised their in

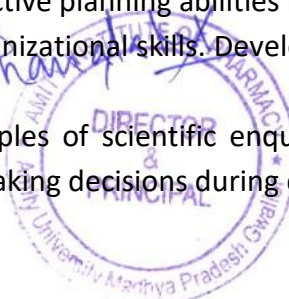
**B. Course Outcome:** *At the end of each course, the student will be able to:*

C604.1	Know [Applying] and understand the processes and terms related to the fate of drug in human body also explain and describe [Remembering] the physicochemical, dosage form and patient related factors affecting absorption, distribution, metabolism and excretion of drugs, Describe [L2: Understanding] the basic concept in Biopharmaceutics and its importance in dosage form design
C604.2	To analyses the bioavailability of a drug and compare the bioequivalence between formulations, Describe [L1: Remembering] and evaluate [L5: Evaluating] bioavailability, bioequivalence and its regulatory requirements for conducting bioequivalence study
C604.3	Apply [L3: Application] the concept of compartment modelling and estimate [L5: Evaluating] the quantity/concentration of drug in body at any point of time.
C604.4	To evaluate various pharmacokinetic parameters for the drugs exhibiting saturation kinetics.
C604.5	Apply [L3: Application] Pharmacokinetics in Clinical Situations

**C. 1. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**2. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**3. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice.



Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**4. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**5. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well-being.

**6. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**7. Pharmaceutical Ethics:** Honor personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**8. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**9. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional Pharmacy Practice

**10. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**11. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self- assess and use feedback effectively

**D. Programme specific outcomes:**

1. Scientific Thinking: Enable student’s knowledge in scientific perception to understand the concepts and to solve the problems positively while making pharmaceutical formulations.

2. Analytical Skills: Assimilate and develop analytical skills using advanced equipment to design and evaluate pharmaceutical products, also to assess their quality.

3. Resource Management: Utilize and manage resources from natural, semi synthetic and synthetic origin to develop real time products with utmost benefit and safety.

4. Public Health Care: Promote and empower the healthy living in the community by various means of awareness and health strategies.

5. Entrepreneurship: Acquire and develop entrepreneurship and administration skills to establish community pharmacy, learning and training centers for the long term wellbeing of society.

**E. Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2 quiz, assignment,		



	open book test, field work, group discussion and seminar)		
	Seminar/ Assignment/Quiz/ Open book test	S/As/Q/OBT	3%
Interaction	Student-Teacher interaction	ST	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

## F. Syllabus

### UNIT-I

Introduction Biopharmaceutics to Absorption; Mechanisms of drug absorption through GIT, factors influencing drug absorption through GIT, absorption of drug from Non per oral extra-vascular routes, Distribution Tissue permeability of drugs, binding of drugs, apparent, volume of drug distribution, plasma and tissue protein binding of drugs, factors affecting protein-drug binding. Kinetics of protein binding, Clinical significance of protein binding of drugs

### UNIT- II

Elimination: Drug metabolism and basic understanding metabolic pathways renal excretion of drugs, factors affecting renal excretion of drugs, renal clearance, Non renal routes of drug excretion of drugs Bioavailability and Bioequivalence: Definition and Objectives of bioavailability, obsolete and relative bioavailability, measurement of bioavailability, in-vitro drug dissolution models, in-vitro-in-vivo correlations, bioequivalence studies, methods to enhance the dissolution rates and bioavailability of poorly soluble drugs.

### UNIT- III

Pharmacokinetics: Definition and introduction to Pharmacokinetics, Compartment models, Non compartment models, physiological models, One compartment open model. (a). Intravenous Injection (Bolus) (b). Intravenous infusion and (c) Extra vascular administrations. Pharmacokinetics parameters -  $KE$ ,  $t_{1/2}$ ,  $V_d$ ,  $AUC$ ,  $K_a$ ,  $Cl_t$  and  $CLR$ - definitions methods of eliminations, understanding of their significance and application

### UNIT- IV

Multi compartment models: Two compartment open model. IV bolus Kinetics of multiple dosing, steady state drug levels, calculation of loading and maintenance doses and their significance in clinical settings.

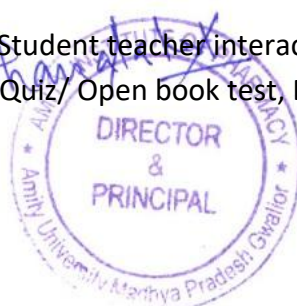
### UNIT- V

Nonlinear Pharmacokinetics: a. Introduction, b. Factors causing Non-linearity. c. Michaelis-menton method of estimating parameters, Explanation with example of drugs.

## G. Examination Scheme:

Components	A	ST	CT	S/As/Q/OBT	EE
Weightage (%)	4	3	15	3	75

CT: Class Test, As: Assignment, ST: Student teacher interaction, S/A/Q/OBT: Seminar/ Assignment/Quiz/ Open book test, EE: End Semester Examination; A: Attendance



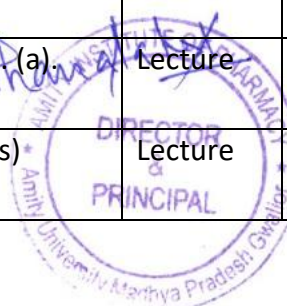
#### H. Suggested Text/Reference Books:

1. Biopharmaceutics and Clinical Pharmacokinetics by, Milo Gibaldi.
2. Biopharmaceutics and Pharmacokinetics; By Robert F Notari
3. Applied biopharmaceutics and pharmacokinetics, Leon Shargel and Andrew B.C.YU 4th edition, Prentice-Hall International edition. USA
4. Bio pharmaceutics and Pharmacokinetics-A Treatise, By D. M. Brahmkar and Sunil B. Jaiswal, Vallabh Prakashan Pitampura, Delhi
5. Pharmacokinetics: By Milo Gibaldi Donald, R. Merceel Dekker Inc.
6. Hand Book of Clinical Pharmacokinetics, By Milo Gibaldi and Laurie Prescott by ADIS Health Science Press.
7. Biopharmaceutics; By Swarbrick
8. Clinical Pharmacokinetics, Concepts and Applications: By Malcolm Rowland and Thomas, N. Tozen, Lea and Febiger, Philadelphia, 1995.
10. Dissolution, Bioavailability and Bioequivalence, By Abdou H.M, Mack, Publishing Company, Pennsylvania 1989.
11. Biopharmaceutics and Clinical Pharmacokinetics-An introduction 4th edition Revised and expanded by Robert F Notari Marcel Dekker Inc, New York and Basel, 1987.
12. Remington's Pharmaceutical Sciences, By Mack Publishing Company, Pennsylvania

#### I. Lecture Plan

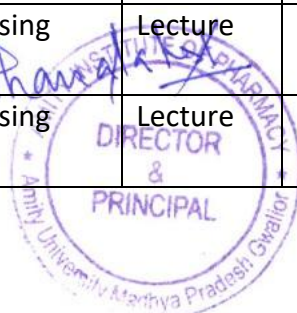
Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Mechanisms of drug absorption through GIT	Lecture	BP604T.1	Mid Term-1, Quiz & End Sem Exam
2	Mechanisms of drug absorption through GIT	Lecture	BP604T.1	Mid Term-1, Quiz & End Sem Exam
3	factors influencing drug absorption through GIT,	Lecture	BP604T.1	Mid Term-1, Quiz & End Sem Exam
4	factors influencing drug absorption through GIT,	Lecture	BP604T.1	Mid Term-1, Quiz & End Sem Exam
5	Tissue permeability of drugs	Lecture	BP604T.1	Mid Term-1, Quiz & End Sem Exam
6	Tissue permeability of drugs	Lecture	BP604T.1	Mid Term-1, Quiz & End Sem Exam
7	binding of drugs	Lecture	BP604T.1	Mid Term-1, Quiz & End Sem Exam
8	binding of drugs	Lecture	BP604T.1	Mid Term-1, Quiz & End Sem Exam
9	apparent, volume of drug distribution,	Lecture	BP604T.1	Mid Term-1, Quiz & End Sem Exam

10	factors affecting protein-drug binding.	Lecture	BP604T.1	Mid Term-1, Quiz & End Sem Exam
11	Kinetics of protein binding, Clinical significance of protein binding of drugs,	Lecture	BP604T.2	Mid Term-1, Quiz & End Sem Exam
12	Drug metabolism and basic understanding metabolic pathways,	Lecture	BP604T.2	Mid Term-1, Quiz & End Sem Exam
13	Drug metabolism and basic understanding metabolic pathways,	Lecture	BP604T.2	Mid Term-1, Quiz & End Sem Exam
14	factors affecting renal excretion of drugs	Lecture	BP604T.2	Mid Term-1, Quiz & End Sem Exam
15	factors affecting renal excretion of drugs	Lecture	BP604T.2	Mid Term-1, Quiz & End Sem Exam
16	renal clearance, Non renal routes of drug excretion of drugs	Lecture	BP604T.2	Mid Term-1, Quiz & End Sem Exam
17	Definition and Objectives of bioavailability ,absolute and relative bioavailability, measurement of bioavailability	Lecture	BP604T.2	Mid Term-1, Quiz & End Sem Exam
18	measurement of bioavailability	Lecture	BP604T.2	Mid Term-1, Quiz & End Sem Exam
19	in-vitro drug dissolution models, in-vitro-in-vivo correlations,	Lecture	BP604T.2	Mid Term-1, Quiz & End Sem Exam
20	in-vitro drug dissolution models, in-vitro-in-vivo correlations,	Lecture	BP604T.2	Mid Term-1, Quiz & End Sem Exam
21	methods to enhance the dissolution rates and bioavailability of poorly soluble drugs.	Lecture	BP604T.2	Mid Term-1, Quiz & End Sem Exam
22	methods to enhance the dissolution rates and bioavailability of poorly soluble drugs	Lecture	BP604T.2	Mid Term-1, Quiz & End Sem Exam
23	Definition and introduction to Pharmacokinetics	Lecture	BP604T.3	Mid Term-1, Quiz & End Sem Exam
24	Definition and introduction to Pharmacokinetics	Lecture	BP604T.3	Mid Term-1, Quiz & End Sem Exam
25	Compartment models, Non compartment models, physiological models	Lecture	BP604T.3	Mid Term-1, Quiz & End Sem Exam
26	Compartment models, Non compartment models, physiological models	Lecture	BP604T.3	Mid Term-1, Quiz & End Sem Exam
27	One compartment open model. (a). Intravenous Injection (Bolus)	Lecture	BP604T.3	Mid Term-1, Quiz & End Sem Exam
28	(a). Intravenous Injection (Bolus)	Lecture	BP604T.3	Mid Term-2, Quiz & End Sem Exam





29	Intravenous infusion	Lecture	BP604T.3	Mid Term-2, Quiz & End Sem Exam
30	Intravenous infusion	Lecture	BP604T.3	Mid Term-2, Quiz & End Sem Exam
31	Intravenous infusion	Lecture	BP604T.3	Mid Term-2, Quiz & End Sem Exam
32	Extra vascular administrations.	Lecture	BP604T.3	Mid Term-2, Quiz & End Sem Exam
33	Pharmacokinetics parameters	Lecture	BP604T.3	Mid Term-2, Quiz & End Sem Exam
34	Pharmacokinetics parameters	Lecture	BP604T.3	Mid Term-2, Quiz & End Sem Exam
35	Multi compartment models	Lecture	BP604T.4	Mid Term-2, Quiz & End Sem Exam
36	Two compartment open model	Lecture	BP604T.4	Mid Term-2, Quiz & End Sem Exam
37	Two compartment open model	Lecture	BP604T.4	Mid Term-2, Quiz & End Sem Exam
38	IV bolus Kinetics of multiple dosing,	Lecture	BP604T.4	Mid Term-2, Quiz & End Sem Exam
39	IV bolus Kinetics of multiple dosing,	Lecture	BP604T.4	Mid Term-2, Quiz & End Sem Exam
40	steady state drug levels	Lecture	BP604T.4	Mid Term-2, Quiz & End Sem Exam
41	steady state drug levels	Lecture	BP604T.4	Mid Term-2, Quiz & End Sem Exam
42	calculation of loading and maintenance doses	Lecture	BP604T.4	Mid Term-2, Quiz & End Sem Exam
43	calculation of loading and maintenance doses	Lecture	BP604T.4	Mid Term-2, Quiz & End Sem Exam
44	Nonlinear Pharmacokinetics: Introduction	Lecture	BP604T.5	Mid Term-2, Quiz & End Sem Exam
45	Factors causing Non-linearity	Lecture	BP604T.5	Mid Term-2, Quiz & End Sem Exam
46	Factors causing Non-linearity	Lecture	BP604T.5	Mid Term-2, Quiz & End Sem Exam
47	Michaelis-menton method of estimating parameters	Lecture	BP604T.5	Mid Term-2, Quiz & End Sem Exam
48	Michaelis-menton method of estimating parameters	Lecture	BP604T.5	Mid Term-2, Quiz & End Sem Exam
49	IV bolus Kinetics of multiple dosing	Lecture	BP604T.5	Mid Term-2, Quiz & End Sem Exam
50	IV bolus Kinetics of multiple dosing	Lecture	BP604T.5	Mid Term-2, Quiz & End Sem Exam



51	IV bolus Kinetics of multiple dosing	Lecture	BP604T.5	Mid Term-2, Quiz & End Sem Exam
52	IV bolus Kinetics of multiple dosing	Lecture	BP604T.5	Mid Term-2, Quiz & End Sem Exam
53	IV bolus Kinetics of multiple dosing	Lecture	BP604T.5	Mid Term-2, Quiz & End Sem Exam
54	IV bolus Kinetics of multiple dosing	Lecture	BP604T.5	Mid Term-2, Quiz & End Sem Exam
55	IV bolus Kinetics of multiple dosing	Lecture	BP604T.5	Mid Term-2, Quiz & End Sem Exam

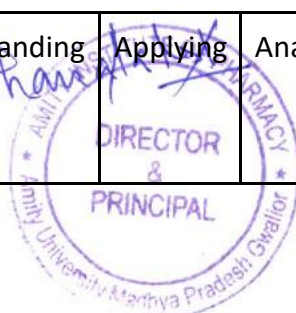
### I. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3	
<b>BP604T.1</b>	Know [Applying] and understand the processes and terms related to the fate of drug in human body also explain and describe [Remembering] the physicochemical, dosage form and patient related factors affecting absorption, distribution, metabolism and excretion of drugs, Describe the basic concept in Biopharmaceutics and its importance in dosage form design	3	1	2	-	-	-	1	3	-	-	3			3	2	-



<b>BP604T.2</b>	To analyses the bioavailability of a drug and compare the bioequivalence between formulations, Describe and evaluate bioavailability, bioequivalence and its regulatory requirements for conducting bioequivalence study	3	2	3	-	-	-	1	3	-	-	3	3	2	-
<b>BP604T.3</b>	Apply the concept of compartment modelling and estimate the quantity/concentration of drug in body at any point of time.	3	2	3	1	-	-	1	3	-	-	3	3	2	-
<b>BP604T.4</b>	To evaluate various pharmacokinetic parameters for the drugs exhibiting saturation kinetics	3	2	3	2	-	-	1	3	-	-	3	3	2	-
<b>BP604T.5</b>	Apply Pharmacokinetics in Clinical Situations	3	2	2	2	-	-	1	3	-	-	3	3	2	-

Amity Institute of Pharmacy Department of Pharmaceutics MID-SEMESTER (SEM –VI) 2023-24						
Class: B.Pharm, VI Semester						
Subject Name: BP 604 T BIOPHARMACEUTICS AND PHARMACOKINETICS		Time: 1 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating



Question Mapping	Q.1,2,3,5	Q.4,7,8	Q.2,3	Q. 9,	Q. 10	
The student will be able to						
C604.1 explain and describe [Remembering] the physicochemical, dosage form and patient related factors affecting absorption, distribution, metabolism and excretion of drugs						
C604.2 To analyses the bioavailability of a drug and compare the bioequivalence between formulations, describe and evaluate bioavailability, bioequivalence and its regulatory requirements for conducting bioequivalence study						
C604.3 Apply the concept of compartment modelling and estimate the quantity/concentration of drug in body at any point of time.						
C604.4 To evaluate various pharmacokinetic parameters for the drugs exhibiting saturation kinetics						
C605.5 Apply Pharmacokinetics in Clinical Situations						
CO Map	Question No.	Question				Marks
CO1	Q.1	Define distribution and bio-availability				2
CO5	Q.2	Define Biotransformation				2
CO2	Q.3	Define time of peak plasma concentration(t <sub>max</sub> ) and C <sub>max</sub>				2
CO5	Q.4	Define Apparent volume of drug distribution with formulae				2
CO2	Q.5	Define Renal clearance				2
CO2	Q.6	Discuss the method of measuring of bioavailability				10
CO3	Q.7	a) Explain phase I cytochrome P-450 oxidation-reduction cycle b) Explain dose adjustment in renal failure patient				10
CO4	Q.8	Find the influence of dosage form and pharmaceutical ingredients in GI absorption				5
CO2	Q.9	Explain theory of dissolution				5
CO5	Q.10	Explain factors affecting tissue permeability of the drug in distribution.				5



Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

31.4 % Percentage of students secured more than 60% marks, so this course BIOPHARMACEUTICS AND PHARMACOKINETICS – THEORY (BP604T) not attained any Level.

*H. H. H. H.*



DIRECTOR  
&  
PRINCIPAL



AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

AMITY INSTITUTE OF PHARMACY

## PROGRAMME OUTCOMES AND PROGRAMME-SPECIFIC OUTCOMES

### **Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24**

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

**[PO.1]. Pharmacy Knowledge:** Posses knowledge and compression of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team -building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well- being.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).



**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self- assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “- “



**PROGRAMME ARTICULATION  
MATRIX**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
VI SEM																
	BP605T	3	1	2	2	1	3	2	1	1	1	2				
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	





# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

<b>DEPARTMENT OF PHARMACEUTICS</b>
<b>Course Handout</b>
Course : Pharmaceutical Biotechnology (Theory)
Course Code : BP605T, Crédits : 04, Session : 2023-24 (Even Sem.), Class : B.Pharm. 3rd Year
Faculty Name : Dr. Rajeev Sharma & Dr. Neeraj Mishra

**A. Introduction:** This course is designed to impart fundamental knowledge on Biopharmaceutical product development and translation from laboratory to market. Moreover, the objective of this course is to understand the importance of Immobilized enzymes in Pharmaceutical Industries, concepts of genetic engineering and applications in relation to production of pharmaceuticals, importance of Monoclonal antibodies in pharmaceutical industries, understand the applications of microorganisms in fermentation technology.

**B. Course Outcomes:** After completion of the course:

**C. BP605T.1.** Students will be able to understand the scientific application of biotechnology in the field of genetic engineering, medicine, and fermentation technology.

**D. BP605T.2.** Students will be able to understand the applications of biotechnology in the diagnosis, prevention, and cure of diseases.

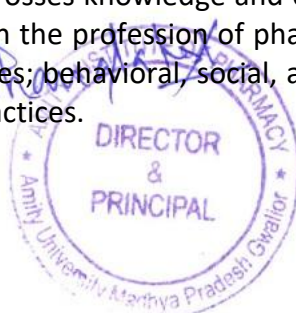
**E. BP605T.3.** Students will be able to understand the concept of Biotechnology and production process of transgenic crops and animals and the prospects of biotechnology.

**F. BP605T.4.** Students will be able to understand the concepts of pharmaceutical biotechnology and enzyme biotechnology

**G. BP605T.5.** Students will be able to utilize the knowledge gained effectively for understanding the applications of biotechnology in the field of medicine, and human health.

**C. Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Posses knowledge and compression of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral social, and administrative pharmacy sciences; and manufacturing practices.



**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team -building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well- being.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

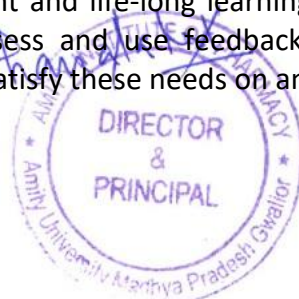
**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

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**[PO.10]. Environment and sustainability:** Understand the impact of professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self- assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.



#### D. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	3%
	Student – Teacher interaction	S-T I	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

#### E. Syllabus

##### UNIT – I

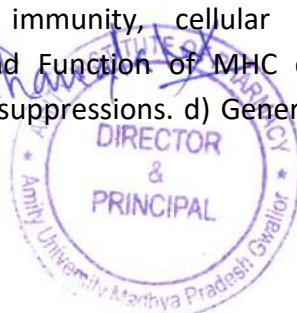
a) Brief introduction to Biotechnology with reference to Pharmaceutical Sciences. b) Enzyme Biotechnology- Methods of enzyme immobilization and applications. c) Biosensors- Working and applications of biosensors in Pharmaceutical Industries. d) Brief introduction to Protein Engineering. e) Use of microbes in industry. Production of Enzymes- General consideration - Amylase, Catalase, Peroxidase, Lipase, Protease, Penicillinase. f) Basic principles of genetic engineering.

##### UNIT – II

a) Study of cloning vectors, restriction endonucleases and DNA ligase. b) Recombinant DNA technology. Application of genetic engineering in medicine. c) Application of r DNA technology and genetic engineering in the production of: i) Interferon ii) Vaccines-hepatitis- B iii) Hormones-Insulin. d) Brief introduction to PCR

##### UNIT – III

Types of immunity- humoral immunity, cellular immunity a) Structure of Immunoglobulins b) Structure and Function of MHC c) Hypersensitivity reactions, Immune stimulation and Immune suppressions. d) General method of the preparation



of bacterial vaccines, toxoids, viral vaccine, antitoxins, serum-immune blood derivatives and other products relative to immunity. e) Storage conditions and stability of official vaccines f) Hybridoma technology- Production, Purification and Applications g) Blood products and Plasma Substitutes.

#### UNIT – IV

Immuno blotting techniques- ELISA, Western blotting, Southern blotting. b) Genetic organization of Eukaryotes and Prokaryotes c) Microbial genetics including transformation, transduction, conjugation, plasmids and transposons. d) Introduction to Microbial biotransformation and applications. e) Mutation: Types of mutation/mutants.

#### UNIT – V

(a) Fermentation methods and general requirements, study of media, equipment's, sterilization methods, aeration process, stirring. b) large scale production fermenter design and its various controls. c) Study of the production of - penicillin's, citric acid, Vitamin B12, Glutamic acid, Griseofulvin, d) Blood Products: Collection, Processing and Storage of whole human blood, dried human plasma, plasma Substitutes.

#### H. Examination Scheme:

Components	A	CT	S/V/Q/HA	STI	EE
Weightage (%)	4	15	3	3	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination; A: Attendance

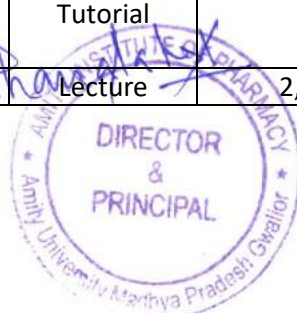
#### F. Suggested Text/Reference Books:

1. B.R. Glick and J.J. Pasternak: Molecular Biotechnology: Principles and Applications of Recombinant DNA: ASM Press Washington D.C.
2. RA Goldshy et. al., : Kuby Immunology.
3. J.W. Goding: Monoclonal Antibodies.
4. J.M. Walker and E.B. Gingold: Molecular Biology and Biotechnology by Royal7 Society of Chemistry.
5. Zaborisky: Immobilized Enzymes, CRC Press, Degrland, Ohio.
6. S.B. Primrose: Molecular Biotechnology (Second Edition) Blackwell Scientific Publication.
7. Stanbury F., P., Whitakar A., and Hall J., S., Principles of fermentation technology, 2nd edition, Aditya books Ltd., New Delhi

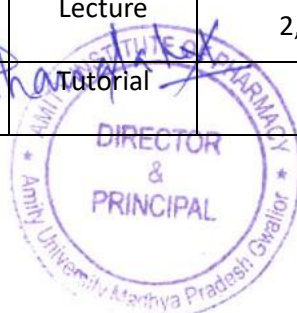


## G. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Brief introduction to Biotechnology with reference to Pharmaceutical Sciences.	Lecture	1	Mid Term-1, Quiz & End Sem Exam
2	Enzyme Biotechnology- Methods of enzyme immobilization	Lecture	1	Mid Term-1, Quiz & End Sem Exam
3	Application o immobilization,	Lecture	1	Mid Term-1, Quiz & End Sem Exam
4	Revision	Tutorial		Mid Term-1, Quiz & End Sem Exam
5	Working principal of biosensor	Lecture	1	Mid Term-1, Quiz & End Sem Exam
6	Applications of biosensors in Pharmaceutical Industries.	Lecture	1	Mid Term-1, Quiz & End Sem Exam
7	Brief introduction to Protein Engineering.	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
8	Quiz	Tutorial		Mid Term-1, Quiz & End Sem Exam
9	Applications of Protein Engineering.	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
10	Use of microbes in industry	Lecture	1,5	Mid Term-1, Quiz & End Sem Exam
11	Production of Enzymes- General consideration – Amylase, Catalase, Peroxidase, Lipase, Protease, Penicillinase.	Lecture	2,5	Mid Term-1, Quiz & End Sem Exam
12	Discussion about enzyme production in industry	Tutorial		Mid Term-1, Quiz & End Sem Exam
13	Basic principles of genetic engineering.	Lecture	2,5	Mid Term-1, Quiz & End Sem Exam
14	Basic principles of genetic engineering.	Lecture	2,5	Mid Term-1, Quiz & End Sem Exam
15	Study of cloning vectors,	Lecture	2	Mid Term-1, Quiz & End Sem Exam
16	Unit test	Tutorial		Mid Term-1, Quiz & End Sem Exam
17	Restriction endonucleases	Lecture	2	Mid Term-1, Quiz & End Sem Exam
18	DNA ligase.	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
19	Recombinant DNA technology	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
20	Group discussion on different topics	Tutorial		Mid Term-1, Quiz & End Sem Exam
21	Application of genetic	Lecture	2,3	Mid Term-1, Quiz &



	engineering in medicine			End Sem Exam
22	Brief introduction to PCR	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
23	Application of PCR	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
24	Quiz	Tutorial		Mid Term-1, Quiz & End Sem Exam
25	Application of r DNA technology	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
26	Genetic engineering in the production of: i) Interferon ii) Vaccines- hepatitis- B	Lecture		Mid Term-1, Quiz & End Sem Exam
27	Production of Hormones- Insulin	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
28	Revision	Tutorial		Mid Term-1, Quiz & End Sem Exam
29	Types of immunity- humoral immunity, cellular immunity	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
30	a) Structure of Immunoglobulins	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
31	b) Structure and Function of MHC	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
32	Group discussion on liquid dosage form	Tutorial		Mid Term-2, Quiz & End Sem Exam
33	c) Hypersensitivity reactions, Immune stimulation and Immune suppressions	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
34	d) General method of the preparation of bacterial vaccines, toxoids, viral vaccine	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
35	Antitoxins, serum-immune blood derivatives and other products relative to immunity.	Lecture	3	Mid Term-2, Quiz & End Sem Exam
36	Seminar	Tutorial		Mid Term-2, Quiz & End Sem Exam
37	Storage conditions and stability of official vaccines	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
38	Hybridoma technology- Production,	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
39	Purification and Applications	Lecture	2,3	Mid Term-2, Quiz & End Sem Exam
40	Unit test	Tutorial		Mid Term-2, Quiz & End Sem Exam
41	Blood products	Lecture	4	Mid Term-2, Quiz & End Sem Exam
42	Plasma Substitutes.	Lecture	1,3	Mid Term-2, Quiz & End Sem Exam
43	Immuno blotting techniques- ELISA,	Lecture	2,4	Mid Term-2, Quiz & End Sem Exam
44	Seminar	Tutorial		Mid Term-2, Quiz & End Sem Exam



45	Western blotting, Southern blotting	Lecture	3,4	Mid Term-2, Quiz & End Sem Exam
46	Genetic organization of Eukaryotes and Prokaryotes	Lecture	1,4	Mid Term-2, Quiz & End Sem Exam
47	Microbial genetics including transformation	Lecture	2,4	Quiz & End Sem Exam
48	Quiz	Tutorial		Quiz & End Sem Exam
49	Transduction, conjugation, plasmids and transposons.	Lecture	4	Quiz & End Sem Exam
50	Introduction to Microbial biotransformation	Lecture	1,4	Quiz & End Sem Exam
51	Application of Biotransformation	Lecture	1,4	Quiz & End Sem Exam
52	Group discussion	Tutorial		Quiz & End Sem Exam
53	Mutation: Types of mutation/mutants.	Lecture	2,4	Quiz & End Sem Exam
54	Fermentation methods and general requirements,	Lecture	2,4	Quiz & End Sem Exam
55	Study of media, equipment's, sterilization methods, aeration process, stirring.	Lecture	1,5	Quiz & End Sem Exam
56	Unit test	Tutorial		Quiz & End Sem Exam
57	Large scale production fermenter design and its various controls;	Lecture	1,5	Quiz & End Sem Exam
58	Study of the production of - penicillin's, citric acid; Vitamin B12, Glutamic acid, Griseofulvin,	Lecture	5	Quiz & End Sem Exam
59	Blood Products: Collection, Processing and Storage of whole human blood, dried human plasma, plasma Substitutes	Lecture	2,5	Quiz & End Sem Exam
60	Unit test	Tutorial		Quiz & End Sem Exam

*A. H. H. H.*  
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&  
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Amity Institute of Pharmacy  
Amity University, Madhya Pradesh Gwalior

H. Course Articulation Matrix (Mapping of COs with POs)

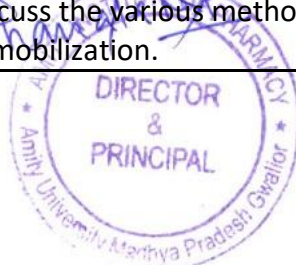
CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES											CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
BP605T.1	BP605T.1. Understanding the importance of Immobilized enzymes in Pharmaceutical Industries	3	3	3	1	-	1	2	1	-	-	1			
BP605T.2	BP605.2. Relate with Genetic engineering applications and production of biopharmaceuticals	2	2	2	3	-	1	1	1	-	-	1			
BP605T.3	BP605T.3. Able to understand the Importance and production of Monoclonal antibodies and applications of Mabs	2	1	1	-	-	1	3	2	-	-	-			
BP605T.4	BP605T.4. Able to Understand the principles of immunity i.e., humoral and cellular immunity	2	2	2	1	-	1	-	-	-	-	-			
BP605T.5	BP605T.5. able to understand use of various microorganisms in fermentation technology.	2	1	-	-	-	2	1	1	-	-	1			

*A. Hirani*  




### Sample Question Paper

Amity Institute of Pharmacy Department of Pharmaceutics MID-SEMESTER (SEM –VIth) 2023-24						
Class: B.Pharm, VI Semester						
Subject Name: BP605T Pharmaceutical Biotechnology (Theory)		Time: 1 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,2,5	Q.3,4,7,8	Q.6	Q. 9,10		
The student will be able to <b>CO1.</b> Understanding the importance of Immobilized enzymes in Pharmaceutical Industries. <b>CO2.</b> Relate with Genetic engineering applications and production of biopharmaceuticals. <b>CO3.</b> Able to understand the Importance and production of Monoclonal antibodies and applications of Mabs. <b>CO4.</b> Able to Understand the principles of immunity i.e., humoral and cellular immunity. <b>CO5.</b> Able to understand use of various microorganisms in fermentation technology.						
<b>CO Map</b>	<b>Question No.</b>	<b>Question</b>				<b>Marks</b>
CO2	Q.1	Define the term 'transposons.				2
CO4	Q.2	What are point mutation? Explain with example.				2
CO5	Q.3	Enlist the names of blood products and plasma Substitutes.				2
CO1	Q.4	Define the term protein engineering and give their applications.				2
CO3	Q.5	Define the term 'Immunoglobulins'. Give their classification.				2
CO5	Q.6	Discuss the layout design of large-scale production fermenter and its various controls.				10
CO2	Q.7	Discuss the applications of r DNA technology and genetic engineering in the production of i) Human Insulin ii) Hepatitis- B vaccine.				10
CO1	Q.8	Discuss the various methods used for enzyme immobilization.				5



CO3	Q.9	Write a note on various storage conditions and stability of official vaccines.	5
CO4	Q.10	Give a brief note on humoral immunity, and cellular immunity.	5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**Attainment Level: 1**

60.5 % Percentage of students secured more than 60% marks, so this course Pharmaceutical Biotechnology (BP605T) attained Level 1.





# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICS

## PROGRAMME OUTCOMES (POs) AND PROGRAMME SPECIFIC OUTCOMES (PSOs) AND PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

Bachelor of Pharmacy (B. Pharm.) Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

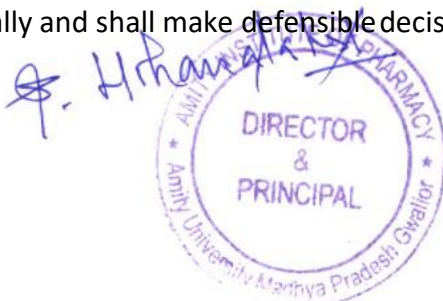
**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### Programme Outcomes (POs):

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.



**[PO.4].** Modern tool usage: Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team -building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well- being.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self- assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.



**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

PROGRAMME ARTICULATION MATRIX																
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
VI SEM	BP606T	3	2	3	3	3	2	3	3	1	1	2		3	3	3
	-															
	-															
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*[Handwritten Signature]*  




# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

<b>DEPARTMENT OF PHARMACEUTICS</b>
<b>Course Handout</b>
Course : PHARMACEUTICAL QUALITY ASSURANCE THEORY
Course Code : BP606T, Crédits : 04, Session :2023-24 (Even Sem.), Class : B.Pharm. 3 <sup>rd</sup> Year
Faculty Name: Dr. Wasim Akram

**A. Introduction:** This course deals with the various aspects of quality control and quality assurance aspects of pharmaceutical industries. It deals with the important aspects like cGMP, QC tests, documentation, quality certifications and regulatory affairs.

- B. Course Outcomes:** At the end of the course, students will be able to:
- BP606T.1.** Understand the cGMP aspects in a pharmaceutical industry.
  - BP606T.2.** Appreciate the importance of documentation.
  - BP606T.3.** Understand the scope of quality certifications applicable to pharmaceutical industries.
  - BP606T.4.** Understand the responsibilities of QA & QC departments.

**C. Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.



**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

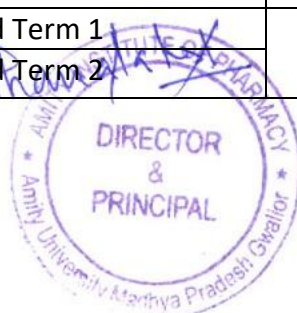
**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**D. Assessment Plan:**

<b>Component of Evaluation</b>	<b>Description</b>	<b>Code</b>	<b>Weightage %</b>
Continuous Internal	Mid Term 1	CT	15%
	Mid Term 2		



Evaluation	Seminar/Viva- Voce/Quiz/Home Assignment	S/V/Q/HA	3%
	Student – Teacher interaction	S-T I	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

*H. H. H. H.*

AMITY INSTITUTE OF PHARMACY  
 \* AMITY UNIVERSITY, MATHYA PRADESH, GWALIOR \*

DIRECTOR  
&  
PRINCIPAL



## E. Syllabus

### UNIT – I

**Quality Assurance and Quality Management concepts:** Definition and concept of Quality control, Quality assurance and GMP

**Total Quality Management (TQM):** Definition, elements, philosophies

**ICH Guidelines:** purpose, participants, process of harmonization, Brief overview of QSEM, with special emphasis on Q-series guidelines, ICH stability testing guidelines

**Quality by design (QbD):** Definition, overview, elements of QbD program, tools

**ISO 9000 & ISO14000:** Overview, Benefits, Elements, steps for registration

**NABL accreditation :** Principles and procedures

### UNIT - II

**Organization and personnel:** Personnel responsibilities, training, hygiene and personal records.

**Premises:** Design, construction and plant layout, maintenance, sanitation, environmental control, utilities and maintenance of sterile areas, control of contamination.

**Equipments and raw materials:** Equipment selection, purchase specifications, maintenance, purchase specifications and maintenance of stores for raw materials.

### UNIT – III

**Quality Control:** Quality control test for containers, rubber closures and secondary packing materials.

**Good Laboratory Practices:** General Provisions, Organization and Personnel, Facilities, Equipment, Testing Facilities Operation, Test and Control Articles, Protocol for Conduct of a Nonclinical Laboratory Study, Records and Reports, Disqualification of Testing Facilities

### UNIT – IV

**Complaints:** Complaints and evaluation of complaints, Handling of return good, recalling and waste disposal.

**Document maintenance in pharmaceutical industry:** Batch Formula Record, Master Formula Record, SOP, Quality audit, Quality Review and Quality documentation, Reports and documents, distribution records.

### UNIT – V

**Calibration and Validation:** Introduction, definition and general principles of calibration, qualification and validation, importance and scope of validation, types of validation, validation master plan. Calibration of pH meter, Qualification of UV-Visible spectrophotometer, General principles of Analytical method Validation.

**Warehousing:** Good warehousing practice, materials management

### F. Examination Scheme:

Components	A	CT	S/V/Q/HA	STI	EE
Weightage (%)	4	15	3	3	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination; A: Attendance

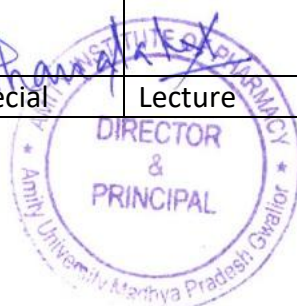


### G. Suggested Text/Reference Books:

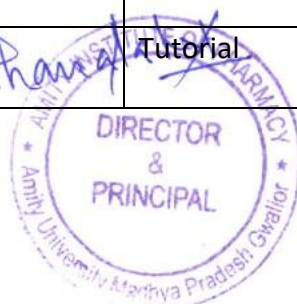
1. Quality Assurance Guide by organization of Pharmaceutical Products of India.
2. Good Laboratory Practice Regulations, 2nd Edition, Sandy Weinberg Vol. 69.
3. Quality Assurance of Pharmaceuticals- A compendium of Guidelines and Related materials Vol I WHO Publications.
4. A guide to Total Quality Management- Kushik Maitra and Sedhan K Ghosh
5. How to Practice GMP's – P P Sharma.
6. ISO 9000 and Total Quality Management – Sadhank G Ghosh
7. The International Pharmacopoeia – Vol I, II, III, IV- General Methods of Analysis and Quality specification for Pharmaceutical Substances, Excipients and Dosage forms
8. Good laboratory Practices – Marcel Dekker Series
9. ICH guidelines, ISO 9000 and 14000 guidelines

### H. Lecture Plan

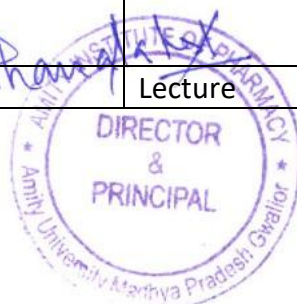
Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Quality Assurance and Quality Management concepts: Definition and concept of Quality control	Lecture	1, 4	Mid Term-1, Quiz & End Sem Exam
2	Quality Assurance and Quality Management concepts: Quality assurance	Lecture	1, 4	Mid Term-1, Quiz & End Sem Exam
3	Quality Assurance and Quality Management concepts	Lecture	1, 4	Mid Term-1, Quiz & End Sem Exam
4	Revision & Discussion	Tutorial	1,4	Mid Term-1, Quiz & End Sem Exam
5	Total Quality Management (TQM)	Lecture	1, 4	Mid Term-1, Quiz & End Sem Exam
6	ICH Guidelines: purpose, participants, process of harmonization, Brief overview of QSEM	Lecture	1, 2	Mid Term-1, Quiz & End Sem Exam
7	ICH Guidelines with special	Lecture	1, 2	Mid



	emphasis on Q-series guidelines, ICH stability testing guidelines			Term-1, Quiz & End Sem Exam
8	Quiz	Tutorial	1,2	Mid Term-1, Quiz & End Sem Exam
9	Quality by design (QbD): Definition, overview, elements of QbD program	Lecture	1, 2	Mid Term-1, Quiz & End Sem Exam
10	Quality by design (QbD): elements of QbD program, tools	Lecture	1, 2	Mid Term-1, Quiz & End Sem Exam
11	ISO 9000 & ISO14000	Lecture	2, 3	Mid Term-1, Quiz & End Sem Exam
12	Revision of QBD	Tutorial	2,3	Mid Term-1, Quiz & End Sem Exam
13	NABL accreditation	Lecture	2, 3	Mid Term-1, Quiz & End Sem Exam
14	Organization and personnel: Personnel responsibilities, training, hygiene and personal records	Lecture	1, 4	Mid Term-1, Quiz & End Sem Exam
15	Organization and personnel: Personnel responsibilities, training, hygiene and personal records	Lecture	1, 4	Mid Term-1, Quiz & End Sem Exam
16	Quiz	Tutorial	1,4	Quiz & End Sem



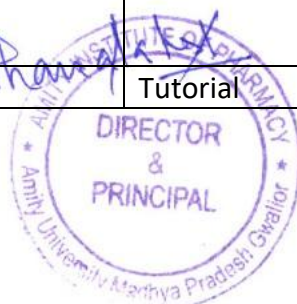
17	Premises: Design, construction and plant layout, maintenance	Lecture	1, 4	Mid Term-1, Quiz & End Sem Exam
18	Premises: sanitation, environmental control	Lecture	1, 4	Mid Term-1, Quiz & End Sem Exam
19	Premises: utilities and maintenance of sterile areas, control of contamination	Lecture	1, 4	Mid Term-1, Quiz & End Sem Exam
20	Revision & Discussion	Tutorial	1,4	Mid Term-1, Quiz & End Sem Exam
21	Premises: utilities and maintenance of sterile areas, control of contamination	Lecture	1, 4	Mid Term-1, Quiz & End Sem Exam
22	Equipments and raw materials: Equipment selection	Lecture	1, 3, 4	Mid Term-1, Quiz & End Sem Exam
23	Equipments and raw materials: purchase specifications	Lecture	1, 3, 4	Mid Term-1, Quiz & End Sem Exam
24	Revision & Discussion	Tutorial	1,3,4	Mid Term-1, Quiz & End Sem Exam
25	Equipments and raw materials: maintenance, purchase specifications	Lecture	1, 3, 4	Mid Term-1, Quiz & End Sem Exam
26	Equipments and raw	Lecture	1, 3, 4	Mid



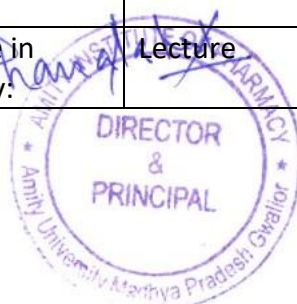
	materials: maintenance of stores for raw materials			Term-1, Quiz & End Sem Exam
27	Quality Control: Quality control test for containers	Lecture	4	Mid Term-1, Quiz & End Sem Exam
28	Presentation	Tutorial	1,4	Mid Term-1, Quiz & End Sem Exam
29	Quality Control: Quality control test for containers	Lecture	4	Mid Term-1, Quiz & End Sem Exam
30	Quality Control: Quality control test for containers	Tutorial	4	Mid Term-2, Quiz & End Sem Exam
31	Quality Control: Quality control test for containers	Tutorial	4	Mid Term-2, Quiz & End Sem Exam
32	Quiz	Tutorial	4	Mid Term-2, Quiz & End Sem Exam
33	Quality Control: Quality control test for rubber closures	Lecture	4	Mid Term-2, Quiz & End Sem Exam
34	Quality Control: Quality control test for secondary packing materials	Lecture	4	Mid Term-2, Quiz & End Sem Exam



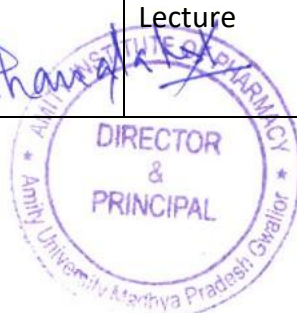
35	Good Laboratory Practices: General Provisions, organization and Personnel,	Lecture	1, 4	Mid Term-2, Quiz & End Sem Exam
36	Revision & Discussion	Tutorial	1,4	Mid Term-2, Quiz & End Sem Exam
37	Good Laboratory Practices: Facilities, Equipment, Testing Facilities Operation	Lecture	1, 4	Mid Term-2, Quiz & End Sem Exam
38	Good Laboratory Practices: Test and Control Articles,	Lecture	1, 4	Mid Term-2, Quiz & End Sem Exam
39	Good Laboratory Practices: Protocol for Conduct of a Nonclinical Laboratory Study	Lecture	1, 4	Mid Term-2, Quiz & End Sem Exam
40	Revision & Discussion	Tutorial	1,4	Mid Term-2, Quiz & End Sem Exam
41	Good Laboratory Practices: Records and Reports, Disqualification of Testing Facilities	Lecture	1, 4	Mid Term-2, Quiz & End Sem Exam
42	Complaints: Complaints and evaluation of complaints	Lecture	2	Mid Term-2, Quiz & End Sem Exam
43	Complaints: Handling of return good	Lecture	2	Mid Term-2, Quiz & End Sem Exam
44	Revision & Discussion	Tutorial	2	Mid



				Term-2, Quiz & End Sem Exam
45	Complaints: Recalling and waste disposal	Lecture	2	Mid Term-2, Quiz & End Sem Exam
46	Document maintenance in pharmaceutical industry: Batch Formula Record, Master Formula Record	Lecture	2	Mid Term-2 Quiz & End Sem Exam
47	Document maintenance in pharmaceutical industry: SOP	Lecture	2	Mid Term-2, Quiz & End Sem Exam
48	Presentation	Tutorial	2	Mid Term-2, Quiz & End Sem Exam
49	Document maintenance in pharmaceutical industry: Quality audit	Lecture	2	Mid Term-2, Quiz & End Sem Exam
50	Document maintenance in pharmaceutical industry: Quality Review and Quality documentation	Lecture	2	Mid Term-2, Quiz & End Sem Exam
51	Document maintenance in pharmaceutical industry: Reports and documents, distribution records	Lecture	2	Mid Term-2, Quiz & End Sem Exam
52	Revision & Discussion	Tutorial	1,4	Mid Term-2, Quiz & End Sem Exam
53	Document maintenance in pharmaceutical industry:	Lecture	2	Mid Term-2,



	introduction, definition and general principles of calibration			Quiz & End Sem Exam
54	Document maintenance in pharmaceutical industry: qualification and validation	Lecture	2	Mid Term-2, Quiz & End Sem Exam
55	Document maintenance in pharmaceutical industry: importance and scope of validation, types of validation	Lecture	2	Mid Term-2, Quiz & End Sem Exam
56	Quiz	Tutorial	1,4	Mid Term-2, Quiz & End Sem Exam
57	Document maintenance in pharmaceutical industry: validation master plan	Lecture	2	Mid Term-2, Quiz & End Sem Exam
58	Document maintenance in pharmaceutical industry: Calibration of pH meter	Lecture	1,4	Mid Term-2, Quiz & End Sem Exam
59	Document maintenance in pharmaceutical industry: Qualification of UV-Visible spectrophotometer	Lecture	1,4	Mid Term-2, Quiz & End Sem Exam
60	Revision & Discussion	Tutorial	1,4	Mid Term-2, Quiz & End Sem Exam
61	Document maintenance in pharmaceutical industry: General principles of Analytical method Validation	Lecture	1,4	Mid Term-2, Quiz & End Sem Exam
62	Warehousing: Good warehousing practice, materials management	Lecture	1, 2	Mid Term-2, Quiz &





				End Sem Exam
63	Stability problems and methods to overcome	Lecture	1, 2, 4	Mid Term-2, Quiz & End Sem Exam

### I. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES											CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
<b>BP606T.1</b>	<b>BP606T.1.</b> understand the cGMP aspects in a pharmaceutical industry.	3	3	2	2	1	1	3	3	1	1	3		3	1	2
<b>BP606T.2.</b>	<b>BP606T.2.</b> appreciate the importance of documentation.	3	2	2	1	-	1	2	3	-	-	3		3	3	2
<b>BP606T.3.</b>	<b>BP606T.3.</b> understand the scope of quality certifications applicable to pharmaceutical industries.	3	3	3	3	-	1	1	1	1	-	3		3	2	2
<b>BP606T.4.</b>	<b>BP606T.4.</b> understand the responsibilities of QA & QC departments.	3	3	3	3	2	2	2	3	2	2	3		3	2	3



## Sample Question Paper

Amity Institute of Pharmacy Department of Pharmaceutics I MID-SEMESTER (SEM – 6 <sup>th</sup> ) 2023-24						
Class: B.Pharm, 6 <sup>th</sup> Semester						
Subject Name: BP606T Pharmaceutical Quality Assurance Theory		Time: 1 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,2,6,8	Q. 3,4, 6,8,9	Q.9,6	Q.10		
<p>The student will be able to</p> <p><b>CO1.</b> Understand the cGMP aspects in a pharmaceutical industry.</p> <p><b>CO2.</b> Appreciate the importance of documentation.</p> <p><b>CO3.</b> Understand the scope of quality certifications applicable to pharmaceutical industries.</p> <p><b>CO4.</b> understand the responsibilities of QA &amp; QC departments.</p>						
CO Map	Question No.	Question				Marks
CO4	Q.1	Write four main purposes of packaging.				2
CO3	Q.2	Write any two differences between GMP and cGMP				2
CO1, 4	Q.3	Write the elements of TQM				2
CO1	Q.4	Write the NABL principles.				2
CO1	Q.5	Discuss in brief ICH stability testing guidelines.				2
CO3, 2	Q.6	Explain the quality control tests for Plastic and rubber closures in pharmaceutical packaging.				10
CO1	Q.7	Describe the personnel responsibilities, training, hygiene, and personal records in the pharmaceutical plant.				10
CO1,2	Q.8	Define the ICH Guideline. Highlight Q guidelines in brief.				5
CO1	Q.9	Write the purchase specifications and maintenance of stores for raw materials				5
CO4	Q.10	Discuss the concept of Quality by design (QbD) in detail.				5



Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**NO Attainment Level:**

59.3 % Percentage of students secured more than 60% marks, so this course QUALITY ASSURANCE –THEORY (BP606T) not attained Level.





AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### Programme Outcomes:

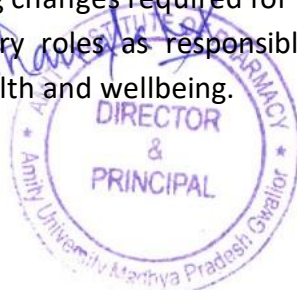
**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.



**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes:**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical chemistry ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3: Substantial (High)

If there is no correlation, put “-”



**PROGRAMME ARTICULATION  
MATRIX**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
VI SEM																
	BP607P	3	1	2	3	1	2	2	1	3	2	2	-	1	2	1

*H. H. H. H.*



DIRECTOR  
&  
PRINCIPAL



<b>DEPARTMENT OF PHARMACEUTICS</b>
<b>Course Handout</b>
Course: Medicinal chemistry III – Practical
Course Code : BP607P, Credits:02, Session:2023-2024, Program: B. Pharm 3 <sup>rd</sup> yr (6 <sup>th</sup> Sem)
Faculty Name : Mr. Deepesh Parashar

**A. Introduction:** This course is designed to impart skill development in the techniques of preparing different conventional dosage forms.

**B. Course Outcomes:** At the end of the course, students will be able to:

- **CO.1** Design and prepare drugs along with their intermediates.
- **CO.2** Perform and understand the assay methods of some important antibiotics.
- **CO.3** Apply skills to synthesize compounds by conventional and Microwave irradiation technique.
- **CO.4** Learn how to use the computer programs to draw chemical structures.
- **CO.5** Learn, apply & gain the knowledge of physicochemical properties by using drug design software Drug likeliness screening (Lipinskies RO5).

**C. Programme Outcomes:**

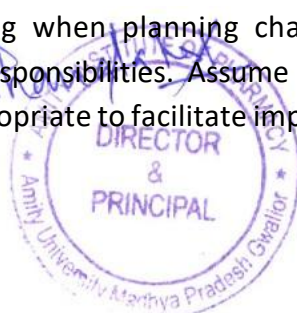
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**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

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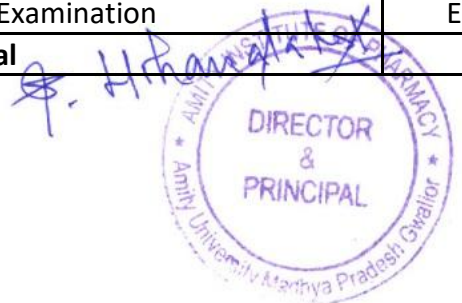
**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**D. Assessment Plan**

		Description	Code	Weightage %
Internal Assessment (15%)	Sessional Examination		SE	10%
	Continuous Mode (5%)	Practical Record	PR	1%
		Viva-voice	V	2%
		Attendance 95% – 100% = 2 90% – 94% = 1.5 85% – 89% = 1 80% – 84% = 0.5 Less than 80 = 0  A candidate is required to put in at least 80% attendance in individual courses considering theory and practical separately. The candidates securing less than 80% attendance are not eligible to appear for the respective examinations.	AT	2%
		End Semester Examination	ESE	35%
<b>Total</b>			<b>50%</b>	





## E. Syllabus

### I Preparation of drugs and intermediates

- 1 Sulphanilamide
- 2 7-Hydroxy, 4-methyl coumarin
- 3 Chlorobutanol
- 4 Triphenyl imidazole
- 5 Tolbutamide
- 6 Hexamine

### II Assay of drugs

- 1 Isonicotinic acid hydrazide
- 2 Chloroquine
- 3 Metronidazole
- 4 Dapsone
- 5 Chlorpheniramine maleate
- 6 Benzyl penicillin

III Preparation of medicinally important compounds or intermediates by Microwave irradiation technique

IV Drawing structures and reactions using chem draw®

V Determination of physicochemical properties such as logP, clogP, MR, Molecular weight, Hydrogen bond donors and acceptors for class of drugs course content using drug design software Drug likeliness screening (Lipinskies RO5)

## F. Examination Scheme:

Components	A	CT	LR	V	EE
Weightage (%)	2	10	1	2	35

CT: Class Test, LR: Lab Record, V: Viva, EE: End Semester Examination; A: Attendance

## G. Recommended Books (Latest Editions)

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
2. Foye's Principles of Medicinal Chemistry.
3. Burger's Medicinal Chemistry, Vol I to IV.
4. Introduction to principles of drug design- Smith and Williams.
5. Remington's Pharmaceutical Sciences.
6. Martindale's extra pharmacopoeia.
7. Organic Chemistry by I.L. Finar, Vol. II.
8. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1-5.
9. Indian Pharmacopoeia.
10. Text book of practical organic chemistry- A.I.Vogel.



## H. Lab Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Synthesis of Sulphanilamide.	Practical	CO1	Mid Term-1, Quiz & End Sem Exam
2	Synthesis of 7- Hydroxy -4- methyl coumarin.	Practical	CO1	Mid Term-1, Quiz & End Sem Exam
3	Synthesis of Chlorobutanol.	Practical	CO1	Mid Term-1, Quiz & End Sem Exam
4	Synthesis of Tolbutamide.	Practical	CO1	Mid Term-1, Quiz & End Sem Exam
5	Synthesis of Hexamine.	Practical	CO1	Mid Term-1, Quiz & End Sem Exam
6	Assay of Isonicotinic acid hydrazide.	Practical	CO 2	Mid Term-1, Quiz & End Sem Exam
7	Assay of Metronidazole.	Practical	CO 2	Mid Term-1, Quiz & End Sem Exam
8	Assay of Dapsone.	Practical	CO 2	Mid Term-2, Quiz & End Sem Exam
9	Assay of Chlorpheniramine Maleate.	Practical	CO 2	Mid Term-2, Quiz & End Sem Exam
10	Assay of Benzyl Penicillin.	Practical	CO 2	Mid Term-2, Quiz & End Sem Exam
11	Synthesis of Phenytoin from Benzil by Microwave Irradiation.	Practical	CO 3	Mid Term-2, Quiz & End Sem Exam
12	Synthesis of Aspirin Assisted by Microwave Oven.	Practical	CO 3	Mid Term-2, Quiz & End Sem Exam
13	Drawing structure and Reaction using Chemdraw.	Practical	CO 4	Mid Term-2, Quiz & End Sem Exam
14	To determine the drug likeness (Lipinski's rule of five) of indomethacin using online tools.	Practical	CO 5	Mid Term-2, Quiz & End Sem Exam

## I. Course Articulation Matrix (Mapping of COs with POs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
<b>CO1</b>	1	1	2	3	2	2	2	2	2	2	2	2	1	-
<b>CO2</b>	1	1	2	3	2	2	2	2	2	2	3	2	1	-
<b>CO3</b>	1	2	2	2	2	2	2	2	2	2	3	2	2	3
<b>CO4</b>	1	2	2	1	2	2	2	1	2	2	1	1	1	1
<b>CO5</b>	1	2	3	1	2	2	2	1	2	2	1	1	1	1

\*Note 1: Strongly related, 2: Moderately related, and 3: Weakly related



### Sample Question Paper

Amity Institute of Pharmacy Department of Pharmaceutical Chemistry I MID-SEMESTER (SEM –VIth) 2023-24						
Class: B. Pharm, I Semester						
Subject Name: BP607P Medicinal Chemistry-III Practical		Time: 4 Hrs			Max. Marks: 40	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		
<b>Student will be able to</b>						
<b>CO.1</b> Design and prepare drugs along with their intermediates.						
<b>CO.2</b> Perform and understand the assay methods of some important antibiotics.						
<b>CO.3</b> Apply skills to synthesize compounds by conventional and Microwave irradiation technique.						
<b>CO.4</b> Learn how to use the computer programs to draw chemical structures.						
<b>CO.5</b> Learn, apply & gain the knowledge of physicochemical properties by using drug design software Drug likeliness screening (Lipinskies RO5).						
CO Map	Question No.	Question				Marks
CO1	Q.1a	Synopsis- The term chemotherapy is used for				2
CO1	Q.1b	Synopsis- Who is regarded as father of chemotherapy?				2
CO1	Q.1c	Synopsis- Penicillin was discovered by scientist				2
CO1,2,4	Q.1d	Synopsis- Which heterocyclic ring is present in the chemical structure of penicillin?				2
CO1,2,4	Q.1e	Synopsis- Which is the beta lactamase inhibitor?				2
CO1,2, 3, 4	Q.2	Experiment- Synthesis of Aspirin Assisted by Microwave Oven.				25
CO1,2,3,4,5	Q.3	Viva				5



Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**Attainment Level:**

95.94 % Percentage of students secured more than 60% marks, so this course Medicinal Chemistry-III PRACTICAL (BP607P) has attained Level 3.





# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

AMITY INSTITUTE OF PHARMACY

## PROGRAMME OUTCOMES

### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

#### Programme Outcomes:

**[PO.1]. Pharmacy Knowledge:** Posses knowledge and compression of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

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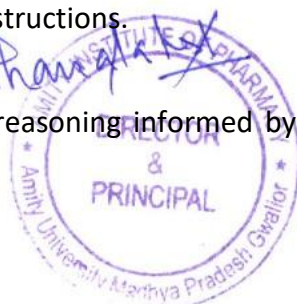
**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team -building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well- being.

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societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

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**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “-”

PROGRAMME ARTICULATION MATRIX												
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
VI SEM	BP 608 P	3	3	3	3	1	3	2	1	3	1	2





## DEPARTMENT OF PHARMACY

### Course Handout

Course : Pharmacology-III (Practical)

Course Code : BP608P, Crédits : 02, Session : 2023-24 (Odd Sem.), Class : B. Pharm. 3rd Year

Faculty Name : Dr. Monika Kaushik

- A. Introduction:** This subject is designed to impart fundamental and practical knowledge of pharmaceutical additives and various pharmaceutical dosage forms on the performance of the drug product.
- B. Course Outcomes:** At the end of the course, students will be able to:
- BP608P.1.** Demonstrate knowledge of drug classification, mechanisms, and therapeutic uses for respiratory and gastrointestinal conditions.
  - BP608P.2.** Analyse drug side effects, contraindications, and safe use for infectious and immune-related diseases.
  - BP608P.3.** Apply principles of toxicology in evaluating drug safety and managing adverse effects.
  - BP608P.4.** Understand chronopharmacology to optimize drug efficacy through timing and dosage adjustments.
  - BP608P.5.** Develop critical thinking in assessing pharmacological data and therapeutic decisions.
- C. Programme Outcomes:**
- [PO.1]. Drug Classification and Mechanisms:** Demonstrate a clear understanding of drug classifications and mechanisms for respiratory, gastrointestinal, and infectious disease treatments.
  - [PO.2]. Therapeutic Applications:** Identify and explain the therapeutic effects and clinical uses of key drugs within respiratory and gastrointestinal systems, and immuno-pharmacology.
  - [PO.3]. Drug Safety and Contraindications:** Analyze the side effects, contraindications, and safety profiles of various drugs, applying this knowledge to ensure safe medication practices.
  - [PO.4]. Principles of Toxicology:** Apply the principles of toxicology to assess drug toxicity, recognize toxic reactions, and recommend appropriate management strategies.
  - [PO.5]. Chronopharmacology Insight:** Understand the role of biological rhythms in pharmacology and apply chronopharmacological principles to enhance drug effectiveness and reduce side effects.
  - [PO.6]. Evidence-Based Pharmacology:** Cultivate skills in evaluating pharmacological research, enabling evidence-based application of drugs in clinical settings.
  - [PO.7]. Critical Decision-Making Skills:** Develop analytical and critical thinking abilities to evaluate therapeutic efficacy and make informed pharmacological decisions.
  - [PO.8]. Patient-Centric Care:** Emphasize patient safety and individualized care by understanding how pharmacology principles impact therapeutic outcomes and patient quality of life.



**[PO.9]. Pharmacological Problem-Solving:** Utilize pharmacology knowledge to solve complex clinical problems, including managing drug interactions and contraindications in multi-drug regimens.

**[PO.10]. Ethical and Professional Competence:** Foster a sense of ethical responsibility and professional competence in the administration and study of drugs, emphasizing the need for safety, accuracy, and empathy in healthcare.

**D. Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	20%
	Mid Term 2		
	A minimum of 80% attendance is required to be maintained by a student to be qualified for taking up the Odd Semester examination	A	4 %
	Practical Records/Regular viva/ Assignment	PR/RV/As	6%
End Semester Examination	End Semester Examination	EE	70%
<b>Total</b>			<b>100%</b>

PR: Practical Records, RV: Regular viva, As: Assignment

**E. Syllabus**

**Module 1: Basic Pharmacological Calculations and Toxicity Assessments**

1. Dose calculation in pharmacological experiments
2. Determination of acute oral toxicity (LD50) of a drug from a given data
3. Determination of acute skin irritation/corrosion of a test substance
4. Determination of acute eye irritation/corrosion of a test substance

**Module 2: Pharmacological Activity and Assays**

5. Antiallergic activity by mast cell stabilization assay
6. Study of anti-ulcer activity of a drug using pylorus ligated (SHAY) rat model and NSAIDs-induced ulcer model
7. Study of effect of drugs on gastrointestinal motility
8. Effect of agonists and antagonists on guinea pig ileum

**Module 3: Experimental Studies on Animal Models**

9. Effect of saline purgative on frog intestine





10. Insulin hypoglycemic effect in rabbit
11. Test for pyrogens (rabbit method)

#### Module 4: Biochemical and Pharmacokinetic Measurements

12. Estimation of serum biochemical parameters using a semi-autoanalyser
13. Calculation of pharmacokinetic parameters from a given data

#### Module 5: Biostatistics in Experimental Pharmacology

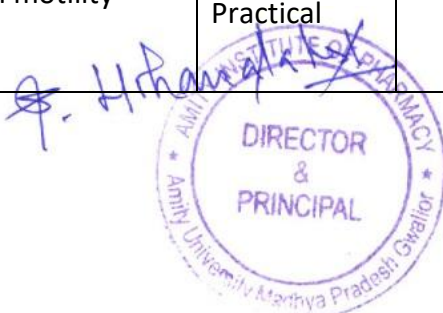
14. Biostatistics methods in experimental pharmacology (Student's t-test, ANOVA)
15. Biostatistics methods in experimental pharmacology (Chi-square test, Wilcoxon Signed Rank test)

#### F. Suggested Text/Reference Books:

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology, Churchill Livingstone Elsevier
2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill
3. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
4. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs. The Point Lippincott Williams & Wilkins
5. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews- Pharmacology
6. K.D.Tripathi. Essentials of Medical Pharmacology, , JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.
7. Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher
- Modern Pharmacology with clinical Applications, by Charles R.Craig & Robert,
8. Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata,
9. Kulkarni SK. Handbook of experimental pharmacology. VallabhPrakashan,
10. N.Udupa and P.D. Gupta, Concepts in Chronopharmacology.

#### G. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1.	Dose calculation in pharmacological experiments	Practical	BP608P	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
2.	Antiallergic activity by mast cell stabilization assay	Practical	BP608P	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
3.	Study of anti-ulcer activity of a drug using pylorus ligand (SHAY) rat model and NSAIDS induced ulcer model.	Practical	BP608P	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
4.	Study of effect of drugs on gastrointestinal motility	Practical	BP608P	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both



5.	Effect of agonist and antagonists on guinea pig ileum	Practical	BP608P	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
6.	Estimation of serum biochemical parameters by using semi- autoanalyser	Practical	BP608P	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
7.	Effect of saline purgative on frog intestine	Practical	BP608P	Mid Term-1 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
8.	Insulin hypoglycemic effect in rabbit	Practical	BP608P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
9.	Test for pyrogens (rabbit method)	Practical	BP608P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
10.	Determination of acute oral toxicity (LD50) of a drug from a given data	Practical	BP608P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
11.	Determination of acute skin irritation / corrosion of a test substance	Practical	BP608P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
12.	Determination of acute eye irritation / corrosion of a test substance	Practical	BP608P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
13.	Calculation of pharmacokinetic parameters from a given data	Practical	BP608P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
14.	Biostatistics methods in experimental pharmacology (student's t test, ANOVA)	Practical	BP608P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both
15.	Biostatistics methods in experimental pharmacology (Chi square test, Wilcoxon Signed Rank test)	Practical	BP608P	Mid Term-2 & End Sem Exam as Synopsis/ Experiments/ Viva voce for both



## H. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES										
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11
<b>BP608P.1</b>	Demonstrate knowledge of drug classification, mechanisms, and therapeutic uses for respiratory and gastrointestinal conditions.	3	1	3	2	1	-	-	-	3	1	3
<b>BP608P.2</b>	Analyze drug side effects, contraindications, and safe use for infectious and immune-related diseases.	3	2	2	2	-	-	-	-	1	-	2
<b>BP608P.3</b>	Apply principles of toxicology in evaluating drug safety and managing adverse effects.	3	1	2	2	-	1	-	-	2	-	1
<b>BP608P.4</b>	Understand chronopharmacology to optimize drug efficacy through timing and dosage adjustments.	3	1	2	2	-	1	-	1	-	-	1
<b>BP608P.5</b>	Develop critical thinking in assessing pharmacological data and therapeutic decisions.	2	2	2	1	1	1	-	-	-	-	1


  
 Director  
&  
Principal

## Sample Question Paper

Amity Institute of Pharmacy Department of Pharmacy I MID-SEMESTER (SEM-VI) 2023-24						
Class: B. Pharm VI Semester						
Subject Name: BP 608 P. Pharmacology-III (Practical)		Time: 4 Hrs			Max. Marks: 40	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,3	Q.2	Q.3	Q.2	Q.2	
Student will be able to CO1: Understand the various pharmaceutical Bioassay techniques. CO2: Recall various considerations required in Experimental Pharmacology						
<b>CO Map</b>	<b>Question No.</b>	<b>Question</b>			<b>Marks</b>	
CO1 and CO2	Q.1	Synopsis			10	
CO1	Q.2	Study of effect of drugs on gastrointestinal motility			25	
CO1 and CO2	Q.3	Viva voce			5	

<b>Attainments</b>		<b>Rubric</b>
<b>Level</b>	1	IF 60% of students secure more than 60% marks then level 1
<b>Level</b>	2	IF 70% of students secure more than 60% marks then level 2
<b>Level</b>	3	IF 80% of students secure more than 60% marks then level 3



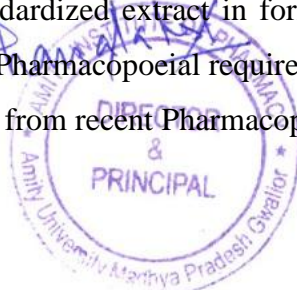


<b>DEPARTMENT OF PHARMACOGNOSY</b>
<b>Course Handout</b>
Course: Herbal Drug Technology (Practical)
Course Code: BP 609 P, Credits:02, Session:2024-2025, Program: B. Pharm 3 <sup>rd</sup> yr (6 <sup>th</sup> Sem)
Faculty Name : Mr. Jamal Basha Dudekula

- 1. Introduction:** This course is designed to provide students with hands-on experience and practical knowledge in the field of *Herbal Drug Technology* specifically related to extraction, identification of different secondary metabolites, herbal drug formulations and ayurvedic formulations like Asava, Arista & Churnas and their evaluation. It also deals with alcohol and aldehyde quantitative determination in ayurvedic formulations.
- 2. Course Outcomes:** At the end of the course, students will be able to:
  - CO.1.** Identify and describe the plant metabolites, apply appropriate extraction techniques and to perform preliminary phytochemical screening methods to identify plant primary & secondary metabolites of crude drugs from the selected medicinal plants.
  - CO.2.** Apply & understand appropriate evaluation methods of herbal excipients like binding agents, disintegrating agents and sweetening agents etc. and students describe the Quantitative analysis of phytochemicals and others in crude extracts, volatile oils, ayurvedic formulations.
  - CO.3.** Demonstrate a comprehensive understanding preparation and standardization of herbal formulation as per Pharmacopoeia requirement guidelines for external applications
  - CO.4.** Demonstrate a comprehensive understanding of the herbal extracts and their formulations development for internal use applications as per regulatory guidelines
  - CO.5.** Students will be able to understand the principles underlying monograph analysis as per Pharmacopoeia

### 3. Syllabus

1. To perform preliminary phytochemical screening of crude drugs.
2. Determination of the alcohol content of Asava and Arista
3. Evaluation of excipients of natural origin
4. Incorporation of prepared and standardized extract in cosmetic formulations like creams, lotions and shampoos and their evaluation.
5. Incorporation of prepared and standardized extract in formulations like syrups, mixtures and tablets and their evaluation as per Pharmacopoeial requirements.
6. Monograph analysis of herbal drugs from recent Pharmacopoeias



7. Determination of Aldehyde content
8. Determination of Phenol content
9. Determination of total alkaloids

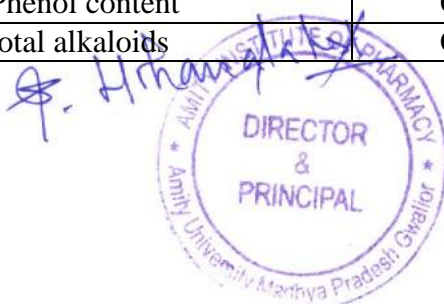
#### 4. Assessment Plan

	Description		Code	Weightage %
	<b>Internal Assessment (15%)</b>	Sessional Examination		SE
<b>Continuous Mode (5%)</b>		Practical Record	PR	1%
		Viva-voice	V	2%
		Attendance 95% – 100% = 2 90% – 94% = 1.5 85% – 89% = 1 80% – 84% = 0.5 Less than 80 = 0  A candidate is required to put in at least 80% attendance in individual courses considering theory and practical separately. The candidates securing less than 80% attendance are not eligible to appear for the respective examinations.	AT	2%
		End Semester Examination		ESE
<b>Total</b>			<b>50%</b>	

**Abbreviations:** SE: Sessional Examination, PR: Practical Record, V: Viva-voice, AT: Attendance, ESE: End Semester Examination

#### 5. Lab Plan

Lab session	Topics	Corresponding CO	Mode of Assessing CO
1	To perform preliminary phytochemical screening of crude drugs	CO 1	Sessional Exam/ Attendance/ Practical Record/Viva/ End-Sem Examination
2	Determination of the alcohol content of Asava and Arista	CO 2	
3	Evaluation of excipients of natural origin	CO 2	
4	Incorporation of prepared and standardized extract in cosmetic formulations like creams, lotions and shampoos and their evaluation.	CO 3	
5	Incorporation of prepared and standardized extract in formulations like syrups, mixtures and tablets and their evaluation as per Pharmacopoeial requirements	CO 4	
6	Monograph analysis of herbal drugs from recent Pharmacopoeias	CO 5	
7	Determination of Aldehyde content	CO 2	
8	Determination of Phenol content	CO 2	
9	Determination of total alkaloids	CO 2	



## 6. Course Articulation Matrix (Mapping of COs with POs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
<b>CO1</b>	3	2	2	2	1	-	1	1	3	2	1	2	1	2
<b>CO2</b>	3	3	3	3	2	1	3	3	2	3	2	3	3	1
<b>CO3</b>	3	2	2	2	1	1	2	1	1	1	1	2	2	1
<b>CO4</b>	3	2	3	2	1	-	1	1	-	-	1	1	1	1
<b>CO5</b>	3	3	3	3	2	1	2	2	1	2	1	2	3	2

\*Note 1: Strongly related, 2: Moderately related, and 3: Weakly related

*H. H. H. H.*

AMITY INSTITUTE OF PHARMACY  
 AMITY UNIVERSITY, MATHYA PRADESH  
 Gwalior

DIRECTOR & PRINCIPAL

*[Handwritten Signature]*







<b>AMITY UNIVERSITY MADHYA PRADESH, GWALIOR</b>
<b>AMITY INSTITUTE OF PHARMACY</b>
<b>DEPARTMENT OF PHARMACEUTICAL CHEMISTRY</b>

**PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES**  
**PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)**  
**Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24**

PEO 1: To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

PEO 2: To identify and nurture leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

PEO 3: To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

PEO 4: To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

**Programme Outcomes:**

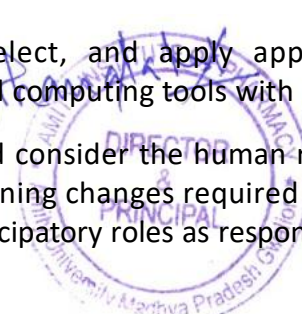
[PO.1]. Pharmacy Knowledge: Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

[PO.2]. Planning Abilities: Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

[PO.3]. Problem analysis: Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

[PO.4]. Modern tool usage: Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

[PO.5]. Leadership skills: Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when



appropriate to facilitate improvement in health and wellbeing.

[PO.6]. Professional Identity: Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

[PO.7]. Pharmaceutical Ethics: Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

[PO.8]. Communication: Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

[PO.9]. The Pharmacist and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

[PO.10]. Environment and sustainability: Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

[PO.11]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**Note: - Correlation levels 1, 2 and 3 as defined below:**

**1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)**

**If there is no correlation, put “-”**

PROGRAMME ARTICULATION MATRIX																
		P O1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
VIISEM	BP701 T	3	-	2	-	1	3	2	1	1	-	2				
	-															
	-															
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# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR
AMITY INSTITUTE OF PHARMACY
DEPARTMENT OF PHARMACEUTICAL CHEMISTRY
Course Handout
Course : INSTRUMENTAL METHODS OF ANALYSIS (Theory)
Course Code : BP701T Crédits : 04, Session :2023-24 (Odd Sem.), Class : B.Pharm. IV Year
Name of the faculty : Dr. Ram Babu Tripathi

**A. Introduction:** This subject deals with the application of instrumental methods in qualitative and quantitative analysis of drugs.

<b>CO-1</b>	Students will be able to illustrate basic knowledge of electronic transitions, chromophores, auxochromes and Beer Lambert's law and application of UV Visible spectroscopy, Fluorimetry and their role in the fields of pharmaceutical industries which will help them in planning, analyzing, and utilizing techniques to increase the analytical knowledge.
<b>CO-2</b>	Students will be able to explain the IR spectroscopy, atomic absorption spectroscopy, turbidimetric analysis and learn use of these analytical techniques in structure elucidation of unknown compounds and helpful in synthesis of new molecules in pharmaceutical industries
<b>CO-3</b>	Students will be able to know the importance and general principles (adsorption and partition), classification and theories (plate and rate) of chromatography and applications of electrophoresis in the field of pharmacy and biotechnology
<b>CO-4</b>	Students will be able to explain the principle and pharmaceutical application of HPLC, GC and to know their importance in the fields of pharmacy and used of advance and modern tools
<b>CO-5</b>	Students will be able to apply the various aspects of Ion exchange, Affinity and gel affinity chromatography and develop various methodologies for assay of drugs

## B. Programme Outcomes:

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

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**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**C. Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	3%
	Student – Teacher interaction	S-T I	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	75%
Total			100%



## D. Syllabus

### UNIT –I 10 Hours

#### UV Visible spectroscopy

Electronic transitions, chromophores, auxochromes, spectral shifts, solvent effect on absorption spectra, Beer and Lambert's law, Derivation and deviations. Instrumentation - Sources of radiation, wavelength selectors, sample cells, detectors- Photo tube, Photomultiplier tube, Photo voltaic cell, Silicon Photodiode. Applications - Spectrophotometric titrations, Single component and multi component analysis

#### Fluorimetry

Theory, Concepts of singlet, doublet and triplet electronic states, internal and external conversions, factors affecting fluorescence, quenching, instrumentation and applications

### UNIT –II 10 Hours

#### IR spectroscopy

Introduction, fundamental modes of vibrations in poly atomic molecules, sample handling, factors affecting vibrations Instrumentation - Sources of radiation, wavelength selectors, detectors - Golay cell, Bolometer, Thermocouple, Thermister, Pyroelectric detector and applications

**Flame Photometry**-Principle, interferences, instrumentation and applications

**Atomic absorption spectroscopy**- Principle, interferences, instrumentation and applications

**Nepheloturbidometry**- Principle, instrumentation and applications

### UNIT –III 10 Hours

#### Introduction to chromatography

**Adsorption and partition column chromatography**-Methodology, advantages, disadvantages and applications.

**Thin layer chromatography**- Introduction, Principle, Methodology, Rf values, advantages, disadvantages and applications.

**Paper chromatography**-Introduction, methodology, development techniques, advantages, disadvantages and applications

**Electrophoresis**- Introduction, factors affecting electrophoretic mobility, Techniques of paper, gel, capillary electrophoresis, applications

### UNIT –IV 08 Hours

**Gas chromatography** - Introduction, theory, instrumentation, derivatization, temperature programming, advantages, disadvantages and applications

**High performance liquid chromatography (HPLC)**-Introduction, theory, instrumentation, advantages and applications.

### UNIT –V 07 Hours

**Ion exchange chromatography**- Introduction, classification, ion exchange resins, properties, mechanism of ion exchange process, factors affecting ion exchange, methodology and applications

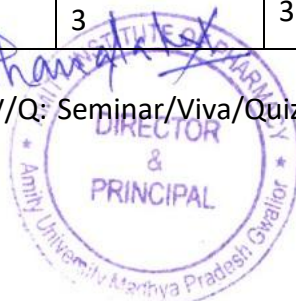
**Gel chromatography**- Introduction, theory, instrumentation and applications

**Affinity chromatography**- Introduction, theory, instrumentation and applications

## E. Examination Scheme:

Components	A	CT	S/V/Q/HA	STI	EE
Weightage (%)	4	15	3	3	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination; A: Attendance



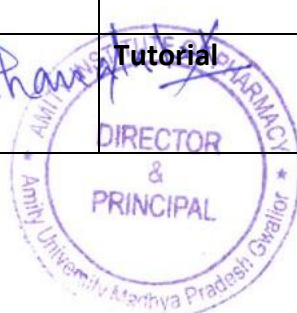
**G. Suggested Text/Reference Books:**

1. Instrumental Methods of Chemical Analysis by B.K Sharma
2. Organic spectroscopy by Y.R Sharma
3. Text book of Pharmaceutical Analysis by Kenneth A. Connors
4. Organic spectroscopy by William Kemp

**H. LECTURE PLAN**

Lecture	Topics	Mode of	Corres	Mode of
1	UV Visible spectroscopy Electronic transitions	Lecture	BP701T .1	Mid Term-1, Quiz & End
2	Chromophores, Auxochromes,	Lecture	BP701T.1	Mid Term-1,
3	Spectral shifts, Solvent effect	Lecture	BP701T.1	Mid Term-1,
4	Absorption spectra, Beer and Lambert's law, Derivation and	Tutorial	BP701T.1	Mid Term-1, Quiz & End
5	Instrumentation - Sources of radiation. wavelength selectors.	Lecture	BP701T.1	Mid Term-1, Quiz & End
6	detectors- Photo tube, Photomultiplier tube, Photo voltaic	Lecture	BP701T.1	Mid Term-1, Quiz & End
7	Applications - Spectrophotometric titrations, Single component and	Lecture	BP701T.1	Mid Term-1, Quiz & End
8	Fluorimetry Theory, Concepts of singlet, doublet	Tutorial	BP701T.1	Mid Term-1, Quiz & End
9	internal and external conversions, factors affecting fluorescence	Lecture	BP701T.1	Mid Term-1, Quiz & End
10	Quenching, instrumentation and applications	Lecture	BP701T.1	Mid Term-1, Quiz & End
11	IR spectroscopy - Introduction,	Lecture	BP701T.1	Mid Term-1, Quiz & End
12	fundamental modes of vibrations in poly atomic molecules,	Tutorial	BP701T.1	Mid Term-1, Quiz & End
13	Sample handling, factors affecting vibrations	Lecture	BP701T.1	Mid Term-1, Quiz & End
14	Instrumentation - Sources of radiation, wavelength selectors,	Lecture	BP701T.1	Mid Term-1, Quiz & End
15	Detectors - Golay cell, Bolometer, Thermocouple, Thermister,	Lecture	BP701T.1	Mid Term-1, Quiz & End
16	Flame Photometry-Principle, interferences, instrumentation	Tutorial	BP701T.2	Mid Term-1, Quiz & End
17	Atomic absorption spectroscopy-	Lecture	BP701T.2	Mid Term-1,

18	<b>Instrumentation and</b>	<b>Lecture</b>	BP701T.2	Mid Term-1,
19	Nepheloturbidometry-	<b>Lecture</b>	BP701T.2	Mid Term-1,
20	<b>Instrumentation</b>	<b>Tutorial</b>	BP701T.2	Mid Term-1,
21	Introduction to chromatography	<b>Lecture</b>	BP701T.3	Mid Term-2,
22	Adsorption and partition column	<b>Lecture</b>	BP701T.3	Mid Term-2,
23	Methodology, advantages,	<b>Lecture</b>	BP701T.3	Mid Term-2,
24	Applications.	<b>Tutorial</b>	BP701T.3	Mid Term-2,
25	<b>Thin layer chromatography-</b>	<b>Lecture</b>	BP701T.3	Mid Term-2,
26	Methodology, Rf values, advantages,	<b>Lecture</b>	BP701T.3	Mid Term-2,
27	<b>Paper chromatography-</b>	<b>Lecture</b>	BP701T.3	Mid Term-2,
28	Advantages, disadvantages and	<b>Tutorial</b>	BP701T.3	Mid Term-2,
29	<b>Electrophoresis</b> – Introduction,	<b>Lecture</b>	BP701T.3	Mid Term-2,
30	Techniques of paper, gel, capillary	<b>Lecture</b>	BP701T.3	Mid Term-2,
31	Gas chromatography	<b>Lecture</b>	BP701T.4	Mid Term-2,
32	Introduction, theory, ,	<b>Tutorial</b>	BP701T.4	Mid Term-2,
33	<b>instrumentation,</b>	<b>Lecture</b>	BP701T.4	Mid Term-2,
34	<b>derivatization</b>	<b>Lecture</b>	BP701T.4	Mid Term-2,
35	<b>Application</b>	<b>Lecture</b>	BP701T.4	Mid Term-2,
36	<b>Diagonalization</b>	<b>Tutorial</b>	BP701T.4	Mid Term-2,
37	<b>High performance liquid chromatography (HPLC)-</b>	<b>Lecture</b>	BP701T.4	Quiz & End Sem Exam
38	Theory, instrumentation,	<b>Lecture</b>	BP701T.4	Quiz & End
39	<b>advantages</b>	<b>Lecture</b>	BP701T.4	Quiz & End
40	<b>applications.</b>	<b>Tutorial</b>	BP701T.4	Quiz & End
41	Ion exchange chromatography-	<b>Lecture</b>	BP701T.5	Quiz & End
42	classification, ion exchange resins,	<b>Lecture</b>	BP701T.5	Quiz & End Sem Exam
43	<b>mechanism of ion exchange</b>	<b>Lecture</b>	BP701T.5	Quiz & End
44	affecting ion exchange,	<b>Tutorial</b>	BP701T.5	Quiz & End
45	Gel chromatography-	<b>Lecture</b>	BP701T.5	Quiz & End
46	<b>instrumentation and</b>	<b>Lecture</b>	BP701T.5	Quiz & End
47	Affinity chromatography-	<b>Lecture</b>	BP701T.5	Quiz & End
48	<b>instrumentation and applications</b>	<b>Tutorial</b>	BP701T.5	Quiz & End Sem Exam

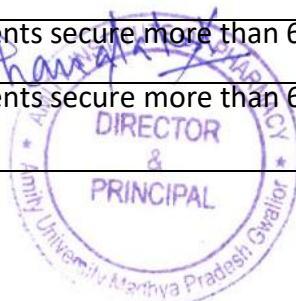


## Sample Question Paper

Amity Institute of Pharmacy Department of Pharmaceutical Chemistry I MID-SEMESTER (SEM –VIIth) 2021-22						
Class: B.Pharm, VII Semester						
Subject Name: BP701T Instrumental Methods of Analysis Theory		Time: 1 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,2,3,4	Q.5,6,8	Q.9	Q.10		
CO Map	Question No.	Question				Marks
CO1	Q.1	Give principle and use of UV spectroscopy				2
CO2	Q.2	Define the term chromophore and auxochrome				2
CO1	Q.3	Define chromatography with examples				2
CO1	Q.4	Give the name of Detector use in HPLC				2
CO3	Q.5	Define the term of NPC & RPC in chromatography				2
CO5	Q.6	Discuss theory, application and instrumentation involved in IR Spectroscopy				10
CO2	Q.7	Give in details about instrumentation and applications of HPLC				10
CO1	Q.8	Explain about Lambert-Beers law				5
CO1	Q.9	Discuss in detail on flame photometry				5
CO4	Q.10	Sampling tech in IR spectroscopy				5

1

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3





**Attainment level:**

63% Percentage of students secured more than 60% marks, so this course: **INSTRUMENTAL METHODS OF ANALYSIS: THEORY (BP701T)** attained any Level 01





AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICS

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

#### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### Programme Outcomes:

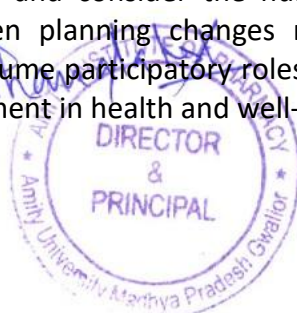
**[PO.1]. Pharmacy Knowledge:** Posses knowledge and compression of the core and basic knowledge assoctied with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team -building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well- being.



**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self- assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “-”



		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
VII SEM	BP 702 T	3	3	3	3	2	2	3	1	1	3	1	3	2	2

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AMITY INSTITUTE OF PHARMACY  
 DIRECTOR & PRINCIPAL  
 Amity University, Madhya Pradesh, Gwalior



# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

<b>DEPARTMENT OF PHARMACY</b>
<b>Course Handout</b>
Course : INDUSTRIAL PHARMACY-II (Theory)
Course Code : BP702T, Credits : 04, Session : 2023-24 (Odd Sem.), Class : B. Pharm. 4th Year
Faculty Name : Dr. Vikas Pandey

**A. Introduction:** This course is designed to impart fundamental knowledge on pharmaceutical product development and translation from laboratory to market. Upon completion of the course, the student shall be able to:

1. Know the process of pilot plant and scale up of pharmaceutical dosage forms
2. Understand the process of technology transfer from lab scale to commercial batch
3. Know different Laws and Acts that regulate pharmaceutical industry
4. Understand the approval process and regulatory requirements for drug products

**B. Course Outcomes:** At the end of the course, students will be able to:

**BP702T.1.** Explain the process of pilot plant scale up of pharmaceutical dosage forms and the process of technology transfer from lab scale to commercial.

**BP702T.2.** Demonstrate the practice and the process of technology transfer from lab scale to commercial.

**BP702T.3.** Recall the different laws and acts that regulate pharmaceutical industry and approval process and regulatory requirements of drug products.

**BP702T.4.** Outline the quality management systems and certifications for pharmaceutical product.

**BP702T.5** Summarize the role and responsibility of Indian regulatory agencies in the approval of drugs.



### C. Programme Outcomes:

**[PO.1].Pharmacy Knowledge:** Posses knowledge and compression of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

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**D. Assessment Plan:**

<b>Component of Evaluation</b>	<b>Description</b>	<b>Code</b>	<b>Weightage %</b>
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	A minimum of 80% attendance is required to be maintained by a student to be qualified for taking up the Odd Semester examination	A	4 %
	Quiz/ Assignment/Open book test/ Field work/Group discussion/ Seminar	Q/A/OBT/FW/GD/S	3%
	Student – Teacher interaction	STA	3%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

Q: Quiz, A: Assignment, OBT: Open book test, FW: Field work, GD: Group discussion, S: Seminar



## E. Syllabus

### Module I: Pilot plant scale up techniques:

General considerations - including significance of personnel requirements, space requirements, raw materials, Pilot plant scale up considerations for solids, liquid orals, semi solids and relevant documentation, SUPAC guidelines, Introduction to platform technology

### Module II: Technology development and transfer:

WHO guidelines for Technology Transfer(TT): Terminology, Technology transfer protocol, Quality risk management, Transfer from R & D to production (Process, packaging and cleaning), Granularity of TT Process (API, excipients, finished products, packaging materials) Documentation, Premises and equipments, qualification and validation, quality control, analytical method transfer, Approved regulatory bodies and agencies, Commercialization - practical aspects and problems (case studies), TT agencies in India - APCTD, NRDC, TIFAC, BCIL, TBSE / SIDBI; TT related documentation - confidentiality agreement, licensing, MoUs, legal issues.

### Module III: Regulatory affairs:

Introduction, Historical overview of Regulatory Affairs, Regulatory authorities, Role of Regulatory affairs department, Responsibility of Regulatory Affairs Professionals.

**Regulatory requirements for drug approval:** Drug Development Teams, Non-Clinical Drug Development, Pharmacology, Drug Metabolism and Toxicology, General considerations of Investigational New Drug (IND) Application, Investigator's Brochure (IB) and New Drug Application (NDA), Clinical research / BE studies, Clinical Research Protocols, Biostatistics in Pharmaceutical Product Development, Data Presentation for FDA Submissions, Management of Clinical Studies.

### Module IV: Quality management systems:

Quality management & Certifications: Concept of Quality, Total Quality Management, Quality by Design (QbD), Six Sigma concept, Out of Specifications (OOS), Change control, Introduction to ISO 9000 series of quality systems standards, ISO 14000, NABL, GLP.

### Module V: Indian Regulatory Requirements:

Central Drug Standard Control Organization (CDSCO) and State Licensing Authority: Organization, Responsibilities, Certificate of Pharmaceutical Product (COPP), Regulatory requirements and approval procedures for New Drugs.

## F. Examination Scheme:

Components	CT	A	Q/A/OBT/FW/GD/S	STI	EE
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<b>Weightage (%)</b>	15	4	3	3	75
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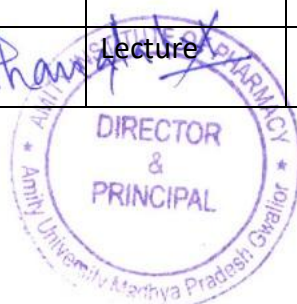
Q: Quiz, A: Assignment, OBT: Open book test, FW: Field work, GD: Group discussion, S: Seminar, STI: Student – Teacher interaction

#### G. Suggested Text/Reference Books:

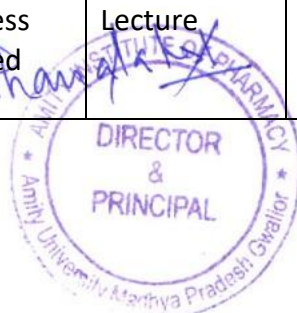
1. Regulatory Affairs from Wikipedia, the free encyclopedia modified on 7<sup>th</sup> April available at [http://en.wikipedia.org/wiki/Regulatory\\_Affairs](http://en.wikipedia.org/wiki/Regulatory_Affairs).
2. International Regulatory Affairs Updates, 2005. available at <http://www.iraup.com/about.php>
3. Douglas J Pisano and David S. Mantus. Text book of FDA Regulatory Affairs A Guide for Prescription Drugs, Medical Devices, and Biologics' Second Edition.
4. Regulatory Affairs brought by learning plus, inc. available at <http://www.cgmp.com/ra.htm>.

#### H. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1.	General considerations	Lecture	BP702T.1	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
2.	Significance of personnel requirements	Lecture	BP702T.1	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
3.	Space requirements	Lecture	BP702T.1	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
4.	Tutorial 01	Tutorial 01	-	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
5.	Raw materials	Lecture	BP702T.1	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
6.	Pilot plant scale up considerations for solids and relevant documentation	Lecture	BP702T.1	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
7.	Pilot plant scale up considerations for	Lecture	BP702T.1	Mid Term-1, Quiz/ Assignment/Open



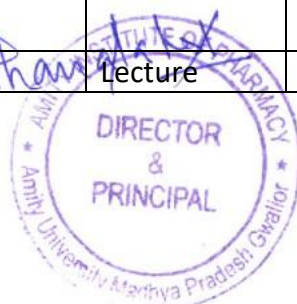
	liquids oral and relevant documentation			book test/ & End Sem Exam
8.	Tutorial 03	Tutorial 03	-	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
9.	Pilot plant scale up considerations for semi solids and relevant documentation	Lecture	BP702T.1	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
10.	SUPAC guidelines	Lecture	BP702T.1	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
11.	SUPAC guidelines	Lecture	BP702T.1	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
12.	Tutorial 04	Tutorial 04	-	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
13.	Platform technology	Lecture	BP702T.1	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
14.	Technology Transfer(TT)	Lecture	BP702T.2	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
15.	Quality risk management, Transfer from R & D to production (Process, packaging and cleaning)	Lecture	BP702T.2	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
16.	Tutorial 04	Tutorial 04	-	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
17.	Granularity of TT Process (API, excipients, finished products, packaging materials)	Lecture	BP702T.2	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
18.	Granularity of TT Process (API, excipients, finished products, packaging	Lecture	BP702T.2	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam



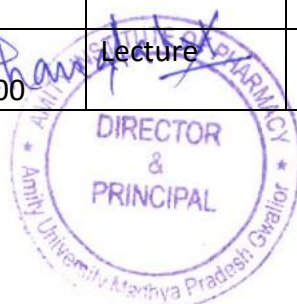
	materials)			Exam
19.	Documentation, Premises and equipments, qualification and validation, quality control, analytical method transfer	Lecture	BP702T.2	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
20.	Tutorial 05	Tutorial 05	-	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
21.	Approved regulatory bodies and agencies, Commercialization - practical aspects and problems (case studies)	Lecture	BP702T.2	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
22.	TT agencies in India - APCTD, NRDC, TIFAC	Lecture	BP702T.2	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
23.	TT agencies in India - BCIL, TBSE /SIDBI	Lecture	BP702T.2	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
24.	Tutorial 06	Tutorial 06	-	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
25.	TT related documentation - confidentiality agreement, licensing	Lecture	BP702T.2	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
26.	MoUs, legal issues	Lecture	BP702T.2	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
27.	Regulatory affairs: Introduction, Historical overview of Regulatory Affairs, Regulatory authorities	Lecture	BP702T.3	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
28.	Tutorial 07	Tutorial 07	-	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam



29.	Role of Regulatory affairs department, Responsibility of Regulatory Affairs Professionals	Lecture	BP702T.3	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
30.	Role of Regulatory affairs department, Responsibility of Regulatory Affairs Professionals	Lecture	BP702T.3	Mid Term-1, Quiz & End Sem Exam
31.	Regulatory requirements for drug approval: Drug Development Teams, Non-Clinical Drug Development, Pharmacology, Drug Metabolism and Toxicology	Lecture	BP702T.3	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
32.	Tutorial 08	Tutorial 08	-	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
33.	Regulatory requirements for drug approval: Drug Metabolism and Toxicology	Lecture	BP702T.3	Mid Term-2, Quiz/ Assignment/Open book test/ & End Sem Exam
34.	General considerations of Investigational New Drug (IND) Application	Lecture	BP702T.3	Mid Term-2, Quiz/ Assignment/Open book test/ & End Sem Exam
35.	Investigator's Brochure (IB) and New Drug Application (NDA)	Lecture	BP702T.3	Mid Term-2, Quiz/ Assignment/Open book test/ & End Sem Exam
36.	Tutorial 09	Tutorial 09	-	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
37.	Clinical research / BE studies, Clinical Research Protocols,	Lecture	BP702T.3	Mid Term-2, Quiz/ Assignment/Open book test/ & End Sem Exam
38.	Biostatistics in	Lecture	BP702T.3	Mid Term-2, Quiz/



	Pharmaceutical Product Development,			Assignment/Open book test/ & End Sem Exam
39.	Data Presentation for FDA Submissions	Lecture	BP702T.3	Mid Term-2, Quiz/ Assignment/Open book test/ & End Sem Exam
40.	Tutorial 10	Tutorial 10	-	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
41.	Management of Clinical Studies	Lecture	BP702T.3	Mid Term-2, Quiz/ Assignment/Open book test/ & End Sem Exam
42.	Quality management systems: Quality management & Certifications: Concept of Quality	Lecture	BP702T.4	Mid Term-2, Quiz/ Assignment/Open book test/ & End Sem Exam
43.	Total Quality Management,	Lecture	BP702T.4	Mid Term-2, Quiz/ Assignment/Open book test/ & End Sem Exam
44.	Tutorial 11	Tutorial 11	-	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
45.	Quality by Design (QbD)	Lecture	BP702T.4	Mid Term-2, Quiz/ Assignment/Open book test/ & End Sem Exam
46.	Six Sigma concept	Lecture	BP702T.4	Mid Term-2, Quiz/ Assignment/Open book test/ & End Sem Exam
47.	Out of Specifications (OOS)	Lecture	BP702T.4	Mid Term-2, Quiz/ Assignment/Open book test/ & End Sem Exam
48.	Tutorial 12	Tutorial 12	-	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
49.	Change control, Introduction to ISO 9000	Lecture	BP702T.4	Mid Term-2, Quiz/ Assignment/Open



	series of quality systems standards			book test/ & End Sem Exam
50.	Change control, Introduction to ISO 9000 series of quality systems standards	Lecture	BP702T.4	Mid Term-2, Quiz/ Assignment/Open book test/ & End Sem Exam
51.	ISO 14000	Lecture	BP702T.4	Mid Term-2, Quiz/ Assignment/Open book test/ & End Sem Exam
52.	Tutorial 13	Tutorial 13	-	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
53.	NABL, GLP	Lecture	BP702T.4	Mid Term-2, Quiz/ Assignment/Open book test/ & End Sem Exam
54.	Indian Regulatory Requirements: Central Drug Standard Control Organization (CDSCO)	Lecture	BP702T.5	Mid Term-2, Quiz/ Assignment/Open book test/ & End Sem Exam
55.	Indian Regulatory Requirements: State Licensing Authority	Lecture	BP702T.5	Mid Term-2, Quiz/ Assignment/Open book test/ & End Sem Exam
56.	Tutorial 14	Tutorial 14	-	Mid Term-1, Quiz/ Assignment/Open book test/ & End Sem Exam
57.	Certificate of Pharmaceutical Product (COPP)	Lecture	BP702T.5	Mid Term-2, Quiz/ Assignment/Open book test/ & End Sem Exam
58.	Certificate of Pharmaceutical Product (COPP)	Lecture	BP702T.5	Mid Term-2, Quiz/ Assignment/Open book test/ & End Sem Exam
59.	Regulatory requirements and approval procedures for New Drugs	Lecture	BP702T.5	Mid Term-2, Quiz/ Assignment/Open book test/ & End Sem Exam
60.	Tutorial 15	Tutorial 15	-	Mid Term-2, Quiz/ Assignment/Open book test/ & End Sem Exam



**I. Course Articulation Matrix (Mapping of COs with POs)**

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES										CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES					
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	
<b>BP702T.1</b>	Explain the process of pilot plant scale up of pharmaceutical dosage forms and the process of technology transfer from lab scale to commercial	2	2	3	2	-	1	2	1	-	-	1	3	2	1		
<b>BP702T.2</b>	Demonstrate the practice and the process of technology transfer from lab scale to commercial	2	2	2	3	-	1	1	1	-	-	1	2	2	1		
<b>BP702T.3</b>	Recall the different laws and acts that regulate pharmaceutical industry and approval process and regulatory requirements of drug products	2	1	1	-	-	1	3	2	-	-	-	1	2	3		
<b>BP702T.4</b>	Outline the quality management systems and certifications for pharmaceutical product	2	2	2	1	-	1	-	-	-	-	-	2	2	2		
<b>BP702T.5</b>	Summarize the role and responsibility of Indian regulatory agencies in the approval of drugs	2	1	-	-	-	2	1	1	-	-	1	1	1	3		

*A. Hirani*  


### Sample Question Paper

Amity Institute of Pharmacy Department of Pharmaceutics I MID-SEMESTER (SEM –VII) 2023-24						
Class: B.Pharm, VII Semester						
Subject Name: BP702T Industrial Pharmacy-II Theory		Time: 1 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.3,4,5	Q.1, 6,8	Q.2, 9	Q.7, 10		
The student will be able to <b>CO1.</b> Explain the process of pilot plant scale up of pharmaceutical dosage forms and the process of technology transfer from lab scale to commercial. <b>CO2.</b> Demonstrate the practice and the process of technology transfer from lab scale to commercial. <b>CO3.</b> Recall the different laws and acts that regulate pharmaceutical industry and approval process and regulatory requirements of drug products <b>CO4.</b> Outline the quality management systems and certifications for pharmaceutical product. <b>CO5.</b> Summarize the role and responsibility of Indian regulatory agencies in the approval of drugs						
CO Map	Question No.	Question				Marks
CO1	Q.1	Define platform technology?				2
CO5	Q.2	What is Drug Master File (DMF)?				2
CO3	Q.3	Enlist the importance of Regulatory affairs in pharmaceutical industry.				2
CO1	Q.4	Enumerate Pilot plant scale up?				2
CO2	Q.5	Mention the various barriers of Technology Transfer.				2
CO1	Q.6	Write in details the Pilot plant scale up considerations for solids.				10
CO1	Q.7	Explain in detail the Technology Transfer Process.				10
CO2	Q.8	Write about the TF agencies in India: BCIL and NRDC.				5
CO4	Q.9	Demonstrate in detail the Quality Risk Management				5





		(QRM).	
CO5	Q.10	Write a detail note on CDSCO.	5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**No Attainment Level:**

73.9 % Percentage of students secured more than 60% marks, so this course Industrial Pharmacy-II – THEORY (BP702T) has attained Level 2.





AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

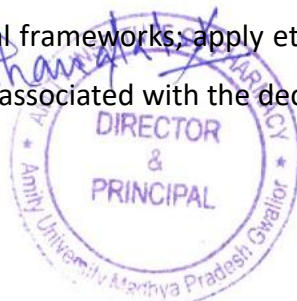
DEPARTMENT OF PHARMACOLOGY

## PROGRAMME OUTCOMES

Bachelor of Pharmacy (B. Pharm) Academic Year – 2023-24

### Programme Outcomes:

- 1. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
- 2. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
- 3. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
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1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “- “

PROGRAMME ARTICULATION MATRIX																
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11				
VII SEM	BP703T	3	2	3	-	-	-	-	-	-	-	-		-	-	-

*[Handwritten Signature]*  
 AMITY INSTITUTE OF PHARMACY  
 DIRECTOR & PRINCIPAL  
 Amity University, Madhya Pradesh Gwalior



# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

<b>DEPARTMENT OF PHARMACOLOGY</b>
<b>Course Handout</b>
Course : Pharmacy Practice- Theory
Course Code BP703T, Crédits : 04, Session :2023-24 (odd Sem.), Class : B.Pharm. 4th Year
Faculty Name : Dr. P. Sagar

## Introduction

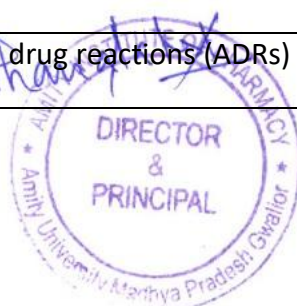
**Scope:** The students are required to learn various skills like drug distribution, drug information, and therapeutic drug monitoring for improved patient care. In community pharmacy, students will be learning various skills such as dispensing of drugs, responding to minor ailments by providing suitable safe medication, patient counselling for improved patient care in the community set up.

## Objectives

1. Able to know various drug distribution methods in a hospital
2. Acquire knowledge of pharmacy stores management and inventory control
3. Obtain medication history interview and counsel the patients
4. Identify drug related problems
6. Detect adverse drug reactions
7. Interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states

**Course Outcomes:** At the end of the course, students will be able to:

BP703T.1	Understand the organization and components of hospital and hospital pharmacy systems – including their structure, roles, and functions.
BP703T.2	Explain adverse drug reactions (ADRs) and drug interactions –



	with an in-depth focus on their causes, types, and management strategies.
BP703T.3	Outline various drug distribution systems and inventory control methods used in hospitals – emphasizing Drug Information services and their importance in hospital settings.
BP703T.4	Generalize the roles and functions of hospital, clinical, and community pharmacists, as well as the therapeutic committee – focusing on their contributions to patient care and medication management.
BP703T.5	Recognize and develop effective communication skills for patient counseling and prescription interpretation – ensuring clarity in medication use and adherence to treatment plans.

#### A. Programme Outcomes:

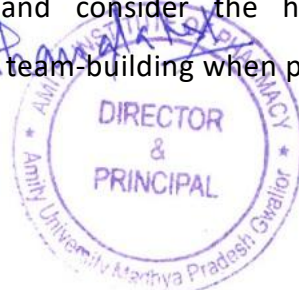
**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.1]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**12. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for

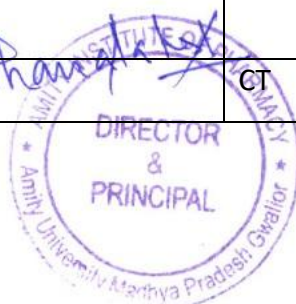


fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

13. **Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).
14. **Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.
15. **Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.
16. **The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.
17. **Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
18. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**B. Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous	Mid Term 1	CT	15%

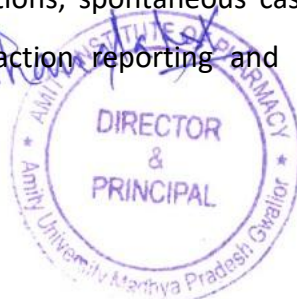


Internal Evaluation			
	Mid Term 2 quiz, assignment, open book test, field work, group discussion and seminar)		
	Seminar/ Assignment/Quiz/ Open book test	S/As/Q/OBT	3%
Interaction	Student-Teacher interaction	ST	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

### C. Syllabus

#### Unit I

a) Hospital and its organization Definition, Classification of hospital- Primary, Secondary and Tertiary hospitals, Classification based on clinical and non- clinical basis, Organization Structure of a Hospital, and Medical staffs involved in the hospital and their functions. b) Hospital pharmacy and its organization Definition, functions of hospital pharmacy, Organization structure, Location, Layout and staff requirements, and Responsibilities and functions of hospital pharmacists. c) Adverse drug reaction Classifications - Excessive pharmacological effects, secondary pharmacological effects, idiosyncrasy, allergic drug reactions, genetically determined toxicity, toxicity following sudden withdrawal of drugs, Drug interaction- beneficial interactions, adverse interactions, and pharmacokinetic drug interactions, Methods for detecting 149 drug interactions, spontaneous case reports and record linkage studies, and Adverse drug reaction reporting and management. d) Community



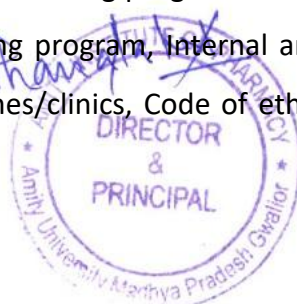
Pharmacy Organization and structure of retail and wholesale drug store, types and design, Legal requirements for establishment and maintenance of a drug store, Dispensing of proprietary products, maintenance of records of retail and wholesale drug store.

## Unit II

a) Drug distribution system in a hospital Dispensing of drugs to inpatients, types of drug distribution systems, charging policy and labelling, Dispensing of drugs to ambulatory patients, and Dispensing of controlled drugs. b) Hospital formulary Definition, contents of hospital formulary, Differentiation of hospital formulary and Drug list, preparation and revision, and addition and deletion of drug from hospital formulary. c) Therapeutic drug monitoring Need for Therapeutic Drug Monitoring, Factors to be considered during the Therapeutic Drug Monitoring, and Indian scenario for Therapeutic Drug Monitoring. d) Medication adherence Causes of medication non-adherence, pharmacist role in the medication adherence, and monitoring of patient medication adherence. e) Patient medication history interview Need for the patient medication history interview, medication interview forms. f) Community pharmacy management Financial, materials, staff, and infrastructure requirements.

## Unit III

a) Pharmacy and therapeutic committee Organization, functions, Policies of the pharmacy and therapeutic committee in including drugs into formulary, inpatient and outpatient prescription, automatic stop order, and emergency drug list preparation. b) Drug information services 150 Drug and Poison information centre, Sources of drug information, Computerised services, and storage and retrieval of information. c) Patient counseling Definition of patient counseling; steps involved in patient counseling, and Special cases that require the pharmacist d) Education and training program in the hospital Role of pharmacist in the education and training program, Internal and external training program, Services to the nursing homes/clinics, Code of ethics for community pharmacy,





and Role of pharmacist in the interdepartmental communication and community health education. e) Prescribed medication order and communication skills Prescribed medication order- interpretation and legal requirements, and Communication skills- communication with prescribers and patients.

#### Unit IV

- a) Budget preparation and implementation Budget preparation and implementation b) Clinical Pharmacy Introduction to Clinical Pharmacy, Concept of clinical pharmacy, functions and responsibilities of clinical pharmacist, Drug therapy monitoring - medication chart review, clinical review, pharmacist intervention, Ward round participation, Medication history and Pharmaceutical care. Dosing pattern and drug therapy based on Pharmacokinetic & disease pattern. c) Over the counter (OTC) sales Introduction and sale of over the counter, and Rational use of common over the counter medications.

#### Unit V

- a) Drug store management and inventory control Organisation of drug store, types of materials stocked and storage conditions, Purchase and inventory control: principles, purchase procedure, purchase order, procurement and stocking, Economic order quantity, Reorder quantity level, and Methods used for the analysis of the drug expenditure b) Investigational use of drugs 151 Description, principles involved, classification, control, identification, role of hospital pharmacist, advisory committee. c) Interpretation of Clinical Laboratory Tests Blood chemistry, hematology, and urinalysis

#### D. Examination Scheme:

Components	A	ST	CT	S/As/Q/OBT	EE
Weightage (%)	4	3	15	3	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

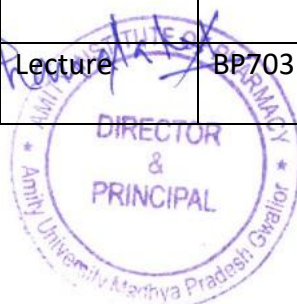


### Suggested Text/Reference Books:

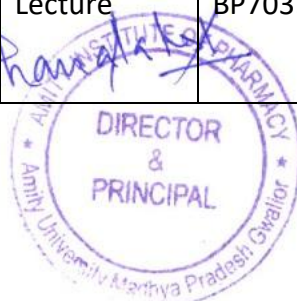
1. Merchant S.H. and Dr. J.S.Quadry. A textbook of hospital pharmacy, 4th ed. Ahmadabad: B.S. Shah Prakashan; 2001.
2. Parthasarathi G, Karin Nyfort-Hansen, Milap C Nahata. A textbook of Clinical Pharmacy Practice- essential concepts and skills, 1 st ed. Chennai: Orient Longman Private Limited; 2004.
3. William E. Hassan. Hospital pharmacy, 5th ed. Philadelphia: Lea & Febiger; 1986.
4. Tipnis Bajaj. Hospital Pharmacy, 1st ed. Maharashtra: Career Publications; 2008.
5. Scott LT. Basic skills in interpreting laboratory data, 4th ed. American Society of Health System Pharmacists Inc; 2009.
6. Parmar N.S. Health Education and Community Pharmacy, 18th ed. India: CBS Publishers & Distributers; 2008.

### E. Lecture Plan

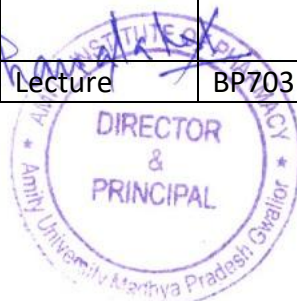
Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Definition, Classification of hospital- Primary, Secondary and Tertiary hospitals	Lecture	BP703.1	Mid Term-1, Quiz & End Sem Exam
2	Classification based on clinical and non-clinical basis	Lecture	BP703.1	Mid Term-1, Quiz & End Sem Exam
3	Organization Structure of a Hospital	Lecture	BP703.1	Mid Term-1, Quiz & End Sem Exam
4	Medical staffs involved in the hospital	Lecture	BP703.1	Mid Term-1, Quiz & End Sem Exam
5	Non-Medical staffs involved in the	Lecture	BP703.1	Mid Term-1, Quiz & End



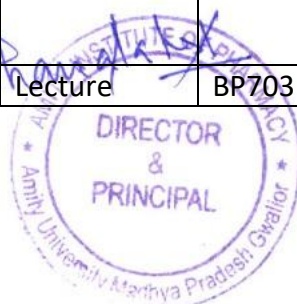
	hospital			Sem Exam
6	Medical staffs involved in the hospital and their Functions	Lecture	BP703.1	Mid Term-1, Quiz & End Sem Exam
7	Non-Medical staffs involved in the hospital and their Functions	Lecture	BP703.1	Mid Term-1, Quiz & End Sem Exam
8	Definition, functions of hospital pharmacy, Organization structure	Lecture	BP703.1	Mid Term-1, Quiz & End Sem Exam
9	Location, Layout and staff requirements,	Lecture	BP703.1	Mid Term-1, Quiz & End Sem Exam
10	Responsibilities and functions of hospital pharmacists.	Lecture	BP703.1	Mid Term-1, Quiz & End Sem Exam
11	Classifications - Excessive pharmacological effects, secondary pharmacological effects, idiosyncrasy, allergic drug reactions,	Lecture	BP703.1	Mid Term-1, Quiz & End Sem Exam
12	genetically determined toxicity, toxicity following sudden withdrawal of drugs, Drug interaction-beneficial interactions, adverse interactions, and pharmacokinetic drug interactions	Lecture	BP703.1	Mid Term-1, Quiz & End Sem Exam
13	Methods for detecting drug interactions,	Lecture	BP703.1	Mid Term-1, Quiz & End Sem Exam



	spontaneous case reports and record linkage studies, and Adverse drug reaction reporting and management.			
14	Organization and structure of retail and wholesale drug store, types and design, Legal requirements for establishment and maintenance of a drug store	Lecture	BP703.2	Mid Term-1, Quiz & End Sem Exam
15	Dispensing of proprietary products, maintenance of records of retail and wholesale drug store	Lecture	BP703.2	Mid Term-1, Quiz & End Sem Exam
16	Dispensing of drugs to inpatients, types of drug distribution systems, charging policy and labelling,	Lecture	BP703.2	Mid Term-1, Quiz & End Sem Exam
17	Dispensing of drugs to ambulatory patients, and Dispensing of controlled drugs.	Lecture	BP703.2	Mid Term-1, Quiz & End Sem Exam
18	Definition, contents of hospital formulary, Differentiation of hospital formulary and Drug list, preparation and revision	Lecture	BP703.2	Mid Term-1, Quiz & End Sem Exam
19	addition and deletion of drug from hospital formulary.	Lecture	BP703.2	Mid Term-1, Quiz & End Sem Exam
20	Need for	Lecture	BP703.2	Mid Term-1,



	Therapeutic Drug Monitoring, Factors to be considered during the Therapeutic Drug Monitoring, and Indian scenario for Therapeutic Drug Monitoring.			Quiz & End Sem Exam
21	Causes of medication non-adherence, pharmacist role in the medication adherence, and	Lecture	BP703.2	Mid Term-2, Quiz & End Sem Exam
22	Monitoring of patient medication adherence	Lecture	BP703.2	Mid Term-2, Quiz & End Sem Exam
23	Need for the patient medication history interview, medication interview form	Lecture	BP703.2	Mid Term-2, Quiz & End Sem Exam
24	Financial, materials, staff, and infrastructure requirements	Lecture	BP703.2	Mid Term-2, Quiz & End Sem Exam
25	Organization, functions, Policies of the pharmacy and therapeutic committee in including drugs into formulary	Lecture	BP703.3	Mid Term-2, Quiz & End Sem Exam
26	inpatient and outpatient prescription, automatic stop order, and emergency drug list preparation	Lecture	BP703.3	Mid Term-2, Quiz & End Sem Exam
27	Drug and Poison information centre, Sources of drug information,	Lecture	BP703.3	Mid Term-2, Quiz & End Sem Exam
28	Computerized	Lecture	BP703.3	Mid Term-2,



	services, and storage and retrieval of information.			Quiz & End Sem Exam
29	Definition of patient counseling; steps involved in patient counseling	Lecture	BP703.3	Mid Term-2, Quiz & End Sem Exam
30	Special cases that require the pharmacist d) Education and training program in the hospital Role of pharmacist in the education and training program, Internal and external training program	Lecture	BP703.4	Mid Term-2, Quiz & End Sem Exam
31	Services to the nursing homes/clinics, Code of ethics for community pharmacy, and Role of pharmacist in the interdepartmental communication and community health education	Lecture	BP703.4	Mid Term-2, Quiz & End Sem Exam
32	Prescribed medication order-interpretation and legal requirements, and Communication skills-communication with prescribers and patients.	Lecture	BP703.4	Mid Term-2, Quiz & End Sem Exam
33	National 158 programme for prevention and control of	Lecture	BP703.4	Mid Term-2, Quiz & End Sem Exam



	deafness,			
34	Budget preparation and implementation b) Introduction to Clinical Pharmacy, Concept of clinical pharmacy, functions and responsibilities of clinical pharmacist	Lecture	BP703.4	Mid Term-2, Quiz & End Sem Exam
35	Drug therapy monitoring - medication chart review, clinical review, pharmacist intervention	Lecture	BP703.4	Mid Term-2, Quiz & End Sem Exam
36	Ward round participation, Medication history and Pharmaceutical care	Lecture	BP703.4	Mid Term-2, Quiz & End Sem Exam
37	Dosing pattern and drug therapy based on Pharmacokinetic & disease pattern	Lecture	BP703.4	Quiz & End Sem Exam
38	Introduction and sale of over the counter, and Rational use of common over the counter medications.	Lecture	BP703.4	Quiz & End Sem Exam
39	Organisation of drug store, types of materials stocked and storage conditions, Purchase and inventory contro	Lecture	BP703.5	Quiz & End Sem Exam
40	Principles, purchase procedure, purchase order	Lecture	BP703.5	Quiz & End Sem Exam



	procurement and stocking,			
41	Economic order quantity, Reorder quantity level, and Methods used for the analysis of the drug expenditure	Lecture	BP703.5	Quiz & End Sem Exam
42	Investigational use of drugs Description, principles involved, classification, control, identification	Lecture	BP703.5	Quiz & End Sem Exam
43	role of hospital pharmacist, advisory committee	Lecture	BP703.5	Quiz & End Sem Exam
44	Blood chemistry, hematology, and urinalysis	Lecture	BP703.5	Quiz & End Sem Exam
45	Blood chemistry, hematology, and urinalysis	Lecture	BP703.5	Quiz & End Sem Exam
46	Future aspects of hospital Pharmacist	Lecture	BP703.5	Quiz & End Sem Exam
47	Future aspects of Clinical Pharmacist	Lecture	BP703.5	Quiz & End Sem Exam
48	Future aspects of Community Pharmacist	Lecture	BP703.5	Quiz & End Sem Exam

**F. Course Articulation Matrix (Mapping of COs with POs)**


CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES										
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11

*F. Hirani*  




<b>BP703.1</b>	Understand the organization and components of hospital and hospital pharmacy systems – including their structure, roles, and functions.	3	3	1	2	1				1		2
<b>BP703.2</b>	<i>Explain adverse drug reactions (ADRs) and drug interactions – with an in-depth focus on their causes, types, and management strategies.</i>	3	3	1	3	2				2		2
<b>BP703.3</b>	<i>Outline various drug distribution systems and inventory control methods used in hospitals – emphasizing Drug Information services and their importance in hospital settings.</i>	3	3	2	3	2				3		2
<b>BP703.4</b>	Generalize the roles and functions of hospital, clinical, and community pharmacists, as well as the therapeutic committee – focusing on their contributions to patient care and medication management.	3	3	2	2	2			2	2		2

*A. H. H. H.*



DIRECTOR  
&  
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<b>BP703.5</b>	Recognize and develop effective communication skills for patient counseling and prescription interpretation – ensuring clarity in medication use and adherence to treatment plans.	3	3	2	3	3			2	2		3

Sample Question Paper

Amity Institute of Pharmacy Department of Pharmacology II MID-SEMESTER (SEM –VII) 2021-22						
Class: B.Pharmacy VII Semester						
Subject Name: BP703T <b>Pharmacy Practice-Theory</b>		Time: 1 Hr			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1, 2, 4, 6, 10	Q. 3, 5, 7, 8, 9	Q.	Q.		Q.
Student will be <b>CO1:</b> Discuss the basic components in organization of hospital & hospital Pharmacy.						



**CO2:** Explain in detail about adverse drug reactions and drug interactions.

**CO3:** Outline various drug distribution systems, Drug Information and concepts of inventory control followed in hospital.

**CO4:** Generalize about organization and functions of Hospital, Clinical and community Pharmacist and Therapeutic Committee.

**CO5:** Recognize the communication abilities in Patient Counselling and Prescription interpretation.

CO Map	Question No.	Question	Marks
CO3	Q.1	Define hospital according to WHO.	2
CO3	Q.2	Define automatic stop orders for dangerous drugs.	2
	Q.3	State the note on 'In-Patient'?	2
CO5	Q.4	Give a brief note on medication error?	2
CO4	Q.5	Enumerate the advantages of a Unit dose dispensing system?	2
CO3	Q.6	Write a note on location, layout, and staff requirements in the hospital pharmacy.	10
	Q.7	Describe the hospital formulary's objectives, needs, advantages, and disadvantages.	10
CO3	Q.8	Enumerate the causes of medication non-adherence.	5
CO3	Q.9	Discuss on the communication skills that required for better patient counseling?	5
CO5	Q.10	Define ADR. Give the significance of monitoring ADR.	5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**Attainments:** Only 41.3 % of Percentage of students secured more than 60% marks, so this course PHARMACY PRACTICE (BP703T) not attained any Level.





# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICS

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

#### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### Programme Outcomes:

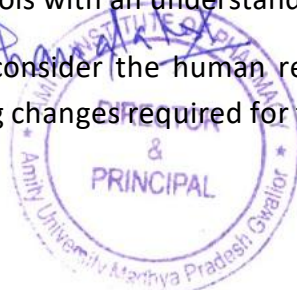
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**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and



societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “-”



**PROGRAMME ARTICULATION  
MATRIX**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
VII SEM																
	BP704T	3	3	3	3	2	2	3	1	1	3	1	-	3	1	1

  
  
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&  
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## DEPARTMENT OF PHARMACEUTICS

### Course Handout

Course : Novel Drug Delivery System (Theory)

Course Code : BP704T, Crédits : 04, Session :2023-24 (Odd Sem.), Class : B.Pharm. IV<sup>th</sup> Year

Faculty Name:Dr. Neeraj Mishra

**A. Introduction:** This course is designed to impart fundamental knowledge on pharmaceutical product development and translation from laboratory to market. Upon completion of the course, the student shall be able to:

1. Know the process of pilot plant and scale up of pharmaceutical dosage forms
2. Understand the process of technology transfer from lab scale to commercial batch
3. Know different Laws and Acts that regulate pharmaceutical industry
4. Understand the approval process and regulatory requirements for drug products

**B. Course Outcomes:** At the end of the course, students will be able to:

**BP704T.1.** Discuss various approaches for development of novel drug delivery systems (NDDS).

**BP704T.2.** Understand the criteria for selection of drugs and polymers.

**BP704T.3.** Discuss the methods of preparation of NDDS.

**BP704T.4.** Discuss the evaluation of NDDS.

**BP704T.5.** Discuss the application of NDDS

**C. Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.



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**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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**D. Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	3%
	Student – Teacher interaction	S-T I	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

*[Handwritten Signature]*  




## E. Syllabus

### Module I: Controlled drug delivery systems

Introduction, terminology/definitions and rationale, advantages, disadvantages, selection of drug candidates. Approaches to design-controlled release formulations based on diffusion, dissolution and ion exchange principles. Physicochemical and biological properties of drugs relevant to controlled release formulations

Polymers: Introduction, classification, properties, advantages, and application of polymers in formulation of controlled release drug delivery systems

### Module II: Microencapsulation

Definition, advantages and disadvantages, microspheres /microcapsules, microparticles, methods of microencapsulation, applications

#### Mucosal Drug Delivery system

Introduction, Principles of bioadhesion / mucoadhesion, concepts, advantages, and disadvantages, transmucosal permeability and formulation considerations of buccal delivery systems

#### Implantable Drug Delivery Systems

Introduction, advantages and disadvantages, concept of implants and osmotic pump

### Module III: Transdermal Drug Delivery Systems

Introduction, Permeation through skin, factors affecting permeation, permeation enhancers, basic components of TDDS, formulation approaches

#### Gastroretentive drug delivery systems

Introduction, advantages, disadvantages, approaches for GRDDS – Floating, high density systems, inflatable and gastroadhesive systems and their applications

#### Nasopulmonary drug delivery system

Introduction to Nasal and Pulmonary routes of drug delivery, Formulation of Inhalers (dry powder and metered dose), nasal sprays, nebulizers

### Module IV: Targeted drug Delivery

Concepts and approaches advantages and disadvantages, introduction to liposomes, niosomes, nanoparticles, monoclonal antibodies and their applications



## Module V: Ocular Drug Delivery Systems

Introduction, intra ocular barriers and methods to overcome –Preliminary study, ocular formulations and ocuserts. Intrauterine Drug Delivery System Introduction, advantages and disadvantages, development of intra uterine devices (IUDs) and applications

### F. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

### G. Suggested Text/Reference Books:

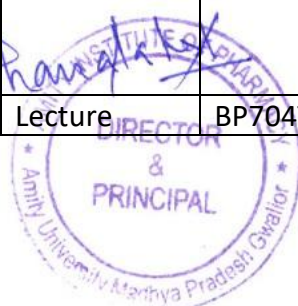
1. Y W. Chien, Novel Drug Delivery Systems, 2 nd edition, revised and expanded, Marcel Dekker, Inc., New York, 1992.
2. Robinson, J. R., Lee V. H. L, Controlled Drug Delivery Systems, Marcel Dekker, Inc., New York, 1992.
3. Encyclopedia of Controlled Delivery. Edith Mathiowitz, Published by Wiley Interscience Publication, John Wiley and Sons, Inc, New York. Chichester/Weinheim
4. N.K. Jain, Controlled and Novel Drug Delivery, CBS PuKhar, Controlled Drug Delivery -conc blishers & Distributors, New Delhi, First edition 1997 (reprint in 2001).
5. S.P. Vyas and R.K. Controlled Drug Delivery -concepts and advances, Vallabh Prakashan, New Delhi, First edition 2002.

### H. Lecture Plan

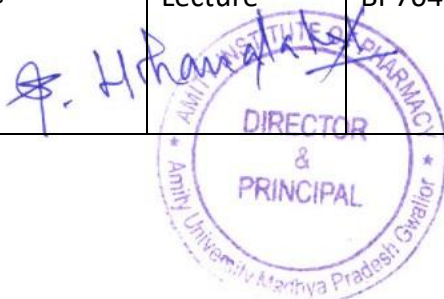
	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction, terminology/definitions, and rationale of CDDS	Lecture	BP704T.1	Mid Term-1, Quiz & End Sem Exam
2	advantages, disadvantages	Lecture	BP704T.1	Mid Term-1, Quiz & End Sem Exam
3	selection of drug candidates	Lecture	BP704T.1	Mid Term-1, Quiz & End Sem Exam



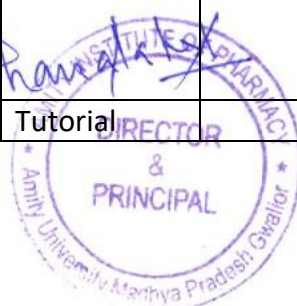
4	Tutorial 01	Tutorial 01		Tutorial 01
5	Approaches to design controlled release formulations based on diffusion	Lecture	BP704T.1	Mid Term-1, Quiz & End Sem Exam
6	Dissolution and ion exchange principles.	Lecture	BP704T.1	Mid Term-1, Quiz & End Sem Exam
7	Physicochemical and biological properties of drugs relevant to controlled release formulations	Lecture	BP704T.1	Mid Term-1, Quiz & End Sem Exam
8	Tutorial 02	Tutorial 02		Tutorial 02
9	Introduction, classification, properties	Lecture	BP704T.1	Mid Term-1, Quiz & End Sem Exam
10	Advantages of polymers	Lecture	BP704T.1	Mid Term-1, Quiz & End Sem Exam
11	Application of polymers in formulation of controlled release drug delivery systems	Lecture	BP704T.1	Mid Term-1, Quiz & End Sem Exam
12	Tutorial 03	Tutorial 03		Tutorial 03
13	Application of polymers in formulation of controlled release drug delivery systems	Lecture	BP704T.1	Mid Term-1, Quiz & End Sem Exam
14	Definition, advantages and disadvantages of microencapsulation	Lecture	BP704T.2	Mid Term-1, Quiz & End Sem Exam
15	Microspheres /microcapsules, microparticles		BP704T.2	
16	Tutorial 04	Tutorial 04		Tutorial 04
17	Methods of microencapsulation, applications	Lecture	BP704T.2	Mid Term-1, Quiz & End Sem Exam
18	Introduction, Principles of bioadhesion / mucoadhesion	Lecture	BP704T.2	Mid Term-1, Quiz & End Sem Exam
19	concepts, advantages and	Lecture	BP704T.2	Mid Term-



	disadvantages			1, Quiz & End Sem Exam
20	Tutorial 05	Tutorial 05		Tutorial 05
21	Transmucosal permeability of buccal delivery systems	Lecture	BP704T.2	Mid Term-1, Quiz & End Sem Exam
22	Formulation considerations of buccal drug delivery system	Lecture	BP704T.2	Mid Term-1, Quiz & End Sem Exam
23	Introduction, advantages, and disadvantages,	Lecture	BP704T.2	Mid Term-1, Quiz & End Sem Exam
24	Tutorial 06	Tutorial 06		Tutorial 06
25	Concept of implants	Lecture	BP704T.2	Mid Term-1, Quiz & End Sem Exam
26	Concept of osmotic pump	Lecture	BP704T.2	Mid Term-2, Quiz & End Sem Exam
27	Introduction, Permeation through skin	Lecture	BP704T.3	Mid Term-2, Quiz & End Sem Exam
28	Tutorial 07	Tutorial 07		Tutorial 07
29	Factors affecting permeation	Lecture	BP704T.3	Mid Term-2, Quiz & End Sem Exam
30	Permeation enhancers,	Lecture	BP704T.3	Mid Term-2, Quiz & End Sem Exam
31	Basic components of TDDS	Lecture	BP704T.3	Mid Term-2, Quiz & End Sem Exam
32	Tutorial 08	Tutorial 08		Tutorial 08
33	Formulation approaches	Lecture	BP704T.3	Mid Term-2, Quiz & End Sem Exam

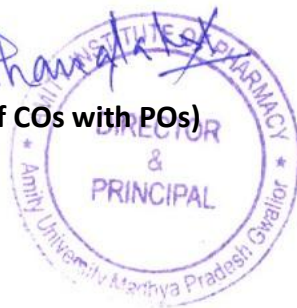


34	Introduction, advantages and disadvantages of GRDDS	Lecture	BP704T.3	Mid Term-2, Quiz & End Sem Exam
35	Approaches for GRDDS	Lecture	BP704T.3	Mid Term-2, Quiz & End Sem Exam
36	Tutorial 09	Tutorial 09		Tutorial 09
37	Floating, high-density systems, inflatable and gastroadhesive systems and their applications	Lecture	BP704T.3	Mid Term-2, Quiz & End Sem Exam
38	Introduction to Nasal and Pulmonary routes of drug delivery	Lecture	BP704T.3	Mid Term-2, Quiz & End Sem Exam
39	Formulation of Inhalers	Lecture	BP704T.3	Mid Term-2, Quiz & End Sem Exam
40	Tutorial 10	Tutorial 10		Tutorial 10
41	Nasal sprays	Lecture	BP704T.3	Mid Term-2, Quiz & End Sem Exam
42	Nebulizers	Lecture	BP704T.3	Mid Term-2, Quiz & End Sem Exam
43	Concepts of approaches of TDDS	Lecture	BP704T.4	Mid Term-2, Quiz & End Sem Exam
44	Tutorial 11	Tutorial 11		Tutorial 11
45	Approaches of TDDS	Lecture	BP704T.4	Mid Term-2, Quiz & End Sem Exam
46	Approaches of TDDS	Lecture	BP704T.4	Mid Term-2, Quiz & End Sem Exam
47	Advantages and disadvantages	Lecture	BP704T.4	Mid Term-2, Quiz & End Sem Exam
48	Tutorial 12	Tutorial		Tutorial 12



		12		
49	Introduction and application of liposomes	Lecture	BP704T.4	Mid Term-2, Quiz & End Sem Exam
50	Introduction to Noisome	Lecture	BP704T.4	Mid Term-2, Quiz & End Sem Exam
51	Application of Noisome	Lecture	BP704T.4	Mid Term-2, Quiz & End Sem Exam
52	<b>Tutorial 13</b>	Tutorial 13		Tutorial 13
53	Introduction and application of Mab	Lecture	BP704T.4	Mid Term-2, Quiz & End Sem Exam
54	Introduction of ocular drug delivery system	Lecture	BP704T.5	Mid Term-2, Quiz & End Sem Exam
55	Intra ocular barriers and methods to overcome	Lecture	BP704T.5	Mid Term-2, Quiz & End Sem Exam
56	Tutorial 14	Tutorial 14		Tutorial 14
57	Preliminary study, ocular formulations and ocuserts	Lecture	BP704T.5	Mid Term-2, Quiz & End Sem Exam
58	Introduction, advantages, and disadvantages	Lecture	BP704T.5	Mid Term-2, Quiz & End Sem Exam
59	Development of intra uterine devices (IUDs) and applications	Lecture	BP704T.5	Mid Term-2, Quiz & End Sem Exam
60	Tutorial 15	Tutorial 15		Tutorial 15

#### H. Course Articulation Matrix (Mapping of COs with POs)

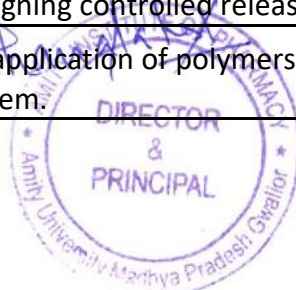


CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
<b>BP704T.1</b>	Discuss various approaches for development of novel drug delivery systems (NDDS).	3	3	3	1	-	1	2	1	-	-	1	1	3	1	1
<b>BP704T.2</b>	Understand the criteria for selection of drugs and polymers.	2	2	2	3	-	1	1	1	-	-	1	-	3	1	1
<b>BP704T.3</b>	Discuss the methods of preparation of NDDS.	2	1	1	-	-	1	3	2	-	-	-	-	3	1	1
<b>BP704T.4</b>	Discuss the evaluation of NDDS.	2	2	2	1	-	1	-	-	-	-	-	-	3	1	1
<b>BP704T.5</b>	Discuss the application of NDDS.	2	1	-	-	-	2	1	1	-	-	1	-	3	1	1


### Sample Question Paper

Amity Institute of Pharmacy Department of Pharmaceutics I MID-SEMESTER (SEM –VII) 2023-24						
Class: B.Pharm, VII Semester						
Subject Name: BP704T Pharmaceutics-I Theory		Time: 1 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,3,4,5	Q.6,8,9	Q.2	Q.7, 10		
The student will be able to <b>CO.1.</b> Discuss various approaches for development of novel drug delivery systems (NDDS). <b>CO.2.</b> Understand the criteria for selection of drugs and polymers. <b>CO.3.</b> Discuss the methods of preparation of NDDS. <b>CO.4.</b> Discuss the evaluation of NDDS. <b>CO.5.</b> Discuss the application of NDDS						
CO Map	Question No.	Question				Marks
CO1,3	Q.1	Differentiate microcapsule and microparticles				2
CO2	Q.2	Differentiate controlled release and sustained release dosage form?				2
CO1,4	Q.3	Enlist various approaches of microencapsulation				2
CO2	Q.4	Classify the polymers used in controlled drug delivery system				2
CO5	Q.5	Enlist the factor affecting GRDDS				2
CO1,3	Q.6	Enumerate the approaches for designing controlled release formulations. Discuss dissolution-based approaches for designing controlled release formulations				10
CO4	Q.7	What are Gastroretentive drug delivery systems and discuss approaches for GRDDS.				10
CO1,2	Q.8	Describe various theories of mucodhesion.				5
CO2,4	Q.9	Discuss the physiochemical and biological properties of drugs for designing controlled release formulations				5
CO5	Q.10	Discuss the application of polymers in controlled drug delivery system.				5





Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**No Attainment Level:**

67.1% Percentage of students secured more than 60% marks, so this course – NOVEL DRUG DELIVERY SYSTEM THEORY (BP704T) attained Level1

*A. H. H. H.*



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AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

#### Programme Educational Objectives (PEOs)

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

#### Programme Outcomes:

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.



**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.



**PROGRAMME ARTICULATION  
MATRIX**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
VII SEM	BP705P	1	3	2	1	3	3	2	2	3	2	2	-	3	2	2
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*A. H. H. H.*



DIRECTOR  
&  
PRINCIPAL



## DEPARTMENT OF PHARMACEUTICAL ANALYSIS

### Course Handout

Course : INSTRUMENTAL METHODS OF ANALYSIS (Practical)

Course Code : BP705P, Crédits : 02, Session :2023-24 (Odd Sem.), Class : B.Pharm. IV Year

Faculty Name: Dr. Ajay Mahor

- A. Introduction:** Perform quantitative & qualitative analysis of drugs using various analytical instruments.
- B. Course Outcomes:** At the end of the course, students will be able to:
- BP705P.1.** Quantitative & qualitative analysis of drugs using various analytical instruments.
  - BP705P.2.** Operate equipment used in the Spectroscopy
  - BP705P.3.** Chromatographic separation and analysis of drugs.
  - BP705P.4.** Applications of chromatography in drug analysis
  - BP705P.5.** Learn to operate sophisticated analytical instruments
- C. Programme Outcomes:**
- [PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
- [PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
- [PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
- [PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
- [PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.
- [PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).



**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

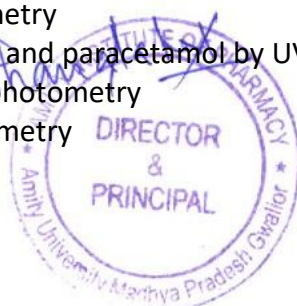
**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### D. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	10%
	Mid Term 2		
	Lab record	LR	1%
	Viva	V	2%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	2%
End Semester Examination	End Semester Examination	EE	35%
<b>Total</b>			<b>50%</b>

#### E. Syllabus

- 1 Determination of absorption maxima and effect of solvents on absorption maxima of organic compounds
- 2 Estimation of dextrose by colorimetry
- 3 Estimation of sulfanilamide by colorimetry
- 4 Simultaneous estimation of ibuprofen and paracetamol by UV spectroscopy
- 5 Assay of paracetamol by UV-Spectrophotometry
- 6 Estimation of quinine sulfate by fluorimetry



- 7 Study of quenching of fluorescence
- 8 Determination of sodium by flame photometry
- 9 Determination of potassium by flame photometry
- 10 Determination of chlorides and sulphates by nephelo turbidometry
- 11 Separation of amino acids by paper chromatography
- 12 Separation of sugars by thin layer chromatography
- 13 Separation of plant pigments by column chromatography
- 14 Demonstration experiment on HPLC
- 15 Demonstration experiment on Gas Chromatography

#### F. Examination Scheme:

Components	A	CT	LR	V	EE
Weightage (%)	2	10	1	2	35

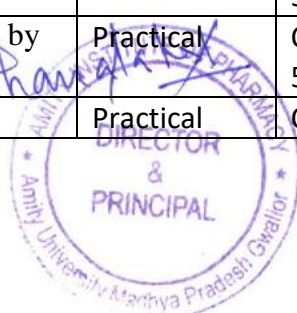
CT: Class Test, LR: Lab Record, V: Viva, EE: End Semester Examination; A: Attendance

#### G. Suggested Text/Reference Books:

1. Practical Pharmaceutical Chemistry by A.H. Beckett and J.B. Stenlake
2. Organic Chemistry by I. L. Finar
3. Quantitative Analysis of Drugs by D. C. Garrett
4. Quantitative Analysis of Drugs in Pharmaceutical Formulations by P. D. Sethi
5. Spectrophotometric identification of Organic Compounds by Silverstein

#### H. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Determination of absorption maxima and effect of solvents on absorption maxima of organic compounds	Practical	CO1, 2, 4, 5	Mid Term-1, Quiz & End Sem Exam
2	Estimation of dextrose by colorimetry	Practical	CO1, 2, 4, 5	Mid Term-1, Quiz & End Sem Exam
3	Estimation of sulfanilamide by colorimetry	Practical	CO1, 2, 4, 5	Mid Term-1, Quiz & End Sem Exam
4	Simultaneous estimation of ibuprofen and paracetamol by UV spectroscopy	Practical	CO1, 2, 4, 5	Mid Term-1, Quiz & End Sem Exam
5	Assay of paracetamol by UV- Spectrophotometry	Practical	CO1, 2, 4, 5	Mid Term-1, Quiz & End Sem Exam
6	Estimation of quinine sulfate by fluorimetry	Practical	CO1, 2, 4, 5	Mid Term-1, Quiz & End Sem Exam
7	Study of quenching of fluorescence	Practical	CO1, 2, 4, 5	Mid Term-1, Quiz & End Sem Exam
8	Determination of sodium by flame photometry	Practical	CO1, 2, 4, 5	Mid Term-2, Quiz & End Sem Exam
9	Determination of potassium by flame photometry	Practical	CO1, 2, 3, 5	Mid Term-2, Quiz & End Sem Exam
10	Determination of chlorides	Practical	CO1, 2, 3, 5	Mid Term-2, Quiz





	and sulphates by nephelo turbidometry		5	& End Sem Exam
11	Separation of amino acids by paper chromatography	Practical	CO1, 2, 3, 5	Mid Term-2, Quiz & End Sem Exam
12	Separation of sugars by thin layer chromatography	Practical	CO1, 2, 4, 5	Mid Term-2, Quiz & End Sem Exam
13	Separation of plant pigments by column chromatography	Practical	CO1, 2, 4, 5	Mid Term-2, Quiz & End Sem Exam
14	Demonstration experiment on HPLC	Practical	CO1, 2, 4, 5	Mid Term-2, Quiz & End Sem Exam
15	Demonstration experiment on Gas Chromatography	Practical	CO1, 2, 4, 5	Mid Term-2, Quiz & End Sem Exam

### I. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES										
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11
<b>BP705P.1</b>	Quantitative & qualitative analysis of drugs using various analytical instruments.	3		2	1	2	1	-	2	1	2	1
<b>BP705P.2</b>	Operate equipment used in the Spectroscopy	2	-	-	1	-	1	-	-	-	-	3
<b>BP705P.3</b>	Chromatographic separation and analysis of drugs	3	2	2	1	-	2	-	2	-	-	3
<b>BP705P.4</b>	Applications of chromatography in drug analysis	2	2	2	1	-	2	-	2	-	-	3
<b>BP705P.5</b>	Learn to operate sophisticated analytical instruments	1	2	3	-	-	2	-	2	-	-	3

*S. H. H. H.*  


## Sample Question Paper

Amity Institute of Pharmacy Department of Pharmaceutical Analysis I MID-SEMESTER (SEM –VIIth) 2023-24						
Class: B.Pharm, VIIth Semester						
Subject Name: BP705P Instrumental Methods Of Analysis Practical		Time: 4 Hrs			Max. Marks: 40	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.3	Q.4	Q.5	Q.2	-
Student will be able to <b>CO.1.</b> Quantitative & qualitative analysis of drugs using various analytical instruments. <b>CO.2.</b> Operate equipment used in the Spectroscopy <b>CO.3.</b> Chromatographic separation and analysis of drugs <b>CO.4.</b> Applications of chromatography in drug analysis <b>CO.5.</b> Learn to operate sophisticated analytical instruments						
CO Map	Question No.	Question				Marks
CO1,2,4	Q.1a	Write the principle involved in separation of sugars by TLC.				4
CO1,2,4	Q.1b	Write the principle involved in the determination of sodium by flame photometry.				4
CO1,2,4	Q.1c	How will you prepare 0.01 N solution of NaOH for 25 ml capacity?				2
CO1,2, 4,5	Q.2	Experiment Determine the amount of Paracetamol present in the given sample by A(1%, 1 cm) method				25
CO1,2,3,4,5	Q.3	Viva				5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3


**Attainment Level 3:**

87.0 % of students secured more than 60% marks, so this course Instrumental Methods of Analysis – Practical (BP705P) attainment is level 3.

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# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICS

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

#### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### Programme Outcomes:

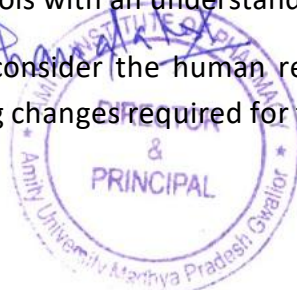
**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and



societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

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**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “-”







<b>DEPARTMENT OF PHARMACEUTICS</b>
<b>Course Handout</b>
Course : BIostatistics AND RESEARCH METHODOLOGY (Theory)
Course Code : BP801T, Crédits : 04, Session :2023-24 (Odd Sem.), Class : B.Pharm. 8th Year
Faculty Name: Dr. Tanweer Haider

**A. Introduction:** The course is designed to impart fundamental knowledge on operation of M.S. Excel, SPSS, R and MINITAB®, DoE (Design of Experiment), the various statistical techniques to solve statistical problems and appreciate statistical techniques in solving the problems.

**B. Course Outcomes:** At the end of the course, students will be able to:

**BP801T.1.** Relate pharmacy education, and statistical analysis with in pharmaceutical research.

**BP801T.2.** Descriptive statistics, Graphics, Correlation, Regression, logistic regression Probability theory, Sampling technique, Parametric tests, Non Parametric tests, ANOVA.

**BP801T.3.** Design of Experiments, Phases of Clinical trials and Observational and Experimental studies.

**BP801T.4.** Introduction to SPSS, R and MINITAB statistical software's, analyzing the statistical data using Excel.

**BP801T.5.** Solve the calculation, and pharmaceutical research result analysis.

**C. Programme Outcomes:**

**Here are five potential Programme Outcomes (POs) based on the given scope and objectives for the course on Biostatistics in Pharmacy:**

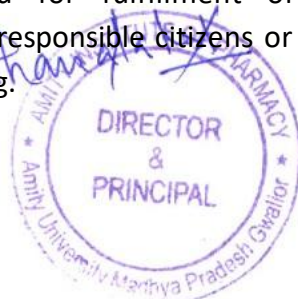
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**D. Assessment Plan:**

<b>Component of Evaluation</b>	<b>Description</b>	<b>Code</b>	<b>Weightage %</b>
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	3%
	Student – Teacher interaction	S-T I	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

*A. H. H. H.*  




## E. Syllabus

### Unit-I

Introduction: Statistics, Biostatistics, Frequency distribution

Measures of central tendency: Mean, Median, Mode- Pharmaceutical examples

Measures of dispersion: Dispersion, Range, standard deviation, Pharmaceutical problems

Correlation: Definition, Karl Pearson's coefficient of correlation, Multiple correlation - Pharmaceuticals examples

### Unit-II

Regression: Curve fitting by the method of least squares, fitting the lines  $y = a + bx$  and  $x = a + by$ , Multiple regression, standard error of regression- Pharmaceutical Examples

Probability: Definition of probability, Binomial distribution, Normal distribution, Poisson's distribution, properties - problems

Sample, Population, large sample, small sample, Null hypothesis, alternative hypothesis, sampling, essence of sampling, types of sampling, Error-I type, Error-II type, Standard error of mean (SEM) - Pharmaceutical examples

Parametric test: t-test (Sample, Pooled or Unpaired and Paired), ANOVA, (One way and Two way), Least Significance difference.

### Unit-III

Non Parametric tests: Wilcoxon Rank Sum Test, Mann-Whitney U test, Kruskal-Wallis test, Friedman Test

Introduction to Research: Need for research, Need for design of Experiments, Experiential Design Technique, plagiarism

Graphs: Histogram, Pie Chart, Cubic Graph, response surface plot, Counter Plot graph

Designing the methodology: Sample size determination and Power of a study, Report writing and presentation of data, Protocol, Cohorts studies, Observational studies, Experimental studies, Designing clinical trial, various phases.

### Unit-IV

Blocking and confounding system for Two-level factorials

Regression modeling: Hypothesis testing in Simple and Multiple regression models

Introduction to Practical components of Industrial and Clinical Trials Problems:

Statistical Analysis Using Excel, SPSS, MINITAB®, DESIGN OF EXPERIMENTS, R -

Online Statistical Software's to Industrial and Clinical trial approach

### Unit-V

Design and Analysis of experiments:

Factorial Design: Definition, 2<sup>2</sup>, 2<sup>3</sup> design. Advantage of factorial design

Response Surface methodology: Central composite design, Historical design, Optimization Techniques

## F. Examination Scheme:

Components	A	CT	S/V/Q/HA	STI	EE
Weightage (%)	4	15	3	3	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination; A: Attendance

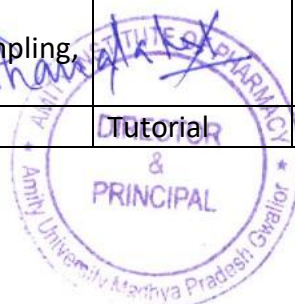
## G. Suggested Text/Reference Books:

1. Pharmaceutical statistics- Practical and clinical applications, Sanford Bolton, publisher Marcel Dekker Inc. NewYork.
2. Fundamental of Statistics - Himalaya Publishing House- S.C. Gupta
3. Design and Analysis of Experiments - PHI Learning Private Limited, R.Pannerselvam,
4. Design and Analysis of Experiments - Wiley Students Edition, Douglas and C. Montgomery

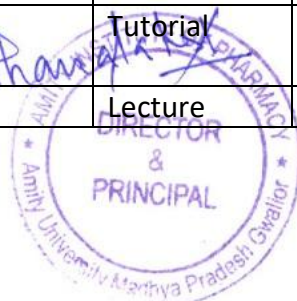


## H. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Statistics, Biostatistics, Frequency distribution	Lecture	1	Mid Term-1, Quiz & End Sem Exam
2	Mean, Median, Mode- Pharmaceutical examples	Lecture	1	Mid Term-1, Quiz & End Sem Exam
3	Dispersion, Range, standard deviation, Pharmaceutical problems	Lecture	1	Mid Term-1, Quiz & End Sem Exam
4	Revision of Biostatistics	Tutorial	1	Mid Term-1, Quiz & End Sem Exam
5	Definition, Karl Pearson's coefficient of correlation,	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
6	Multiple correlation - Pharmaceuticals examples	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
7	Curve fitting by the method of least squares, fitting the lines $y = a + bx$ and $x = a + by$	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
8	Quiz	Tutorial		Mid Term-1, Quiz & End Sem Exam
9	Multiple regression, standard error of regression- Pharmaceutical Examples	Lecture	2	Mid Term-1, Quiz & End Sem Exam
10	Multiple regression, standard error of regression- Pharmaceutical Examples	Lecture	2	Mid Term-1, Quiz & End Sem Exam
11	Definition of probability, Binomial distribution, Normal distribution	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
12	Discussion about Multiple regression, Binomial distribution and Normal distribution	Tutorial		Mid Term-1, Quiz & End Sem Exam
13	Poisson's distribution, properties - problems	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
14	Sample, Population, large sample, small sample	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
15	Null hypothesis, alternative hypothesis, sampling, essence of sampling, types of sampling	Lecture	2	Mid Term-1, Quiz & End Sem Exam
16	Unit test	Tutorial		Mid Term-1, Quiz

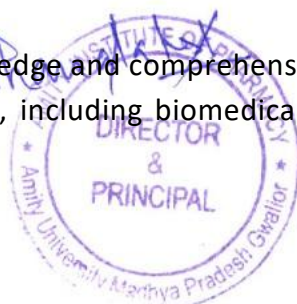


				& End Sem Exam
17	Error-I type, Error-II type	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
18	Standard error of mean (SEM) - Pharmaceutical examples	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
19	t-test(Sample, Pooled or Unpaired and Paired)	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
20	Group discussion on different topics	Tutorial		Mid Term-1, Quiz & End Sem Exam
21	ANOVA, (One way and Two way)	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
22	ANOVA, (One way and Two way)	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
23	Wilcoxon Rank Sum Test, Mann-Whitney U test	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
24	Quiz	Tutorial		Mid Term-1, Quiz & End Sem Exam
25	Kruskal-Wallis test, Friedman Test	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
26	Need for research, Need for design of Experiments	Lecture	3	Mid Term-1, Quiz & End Sem Exam
27	Experiential Design Technique, plagiarism	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
28	Revision of ANOVA	Tutorial		Mid Term-1, Quiz & End Sem Exam
29	Histogram, Pie Chart	Lecture	2,3	Mid Term-1, Quiz & End Sem Exam
30	Cubic Graph	Lecture	2,3,4	Mid Term-1, Quiz & End Sem Exam
31	Response surface plot, Counter Plot graph	Lecture	3,5	Mid Term-2, Quiz & End Sem Exam
32	Group discussion on Biostatistics	Tutorial		Mid Term-2, Quiz & End Sem Exam
33	Response surface plot, Counter Plot graph	Lecture	3,5	Mid Term-2, Quiz & End Sem Exam
34	Sample size determination	Lecture	1	Mid Term-2, Quiz & End Sem Exam
35	Power of a study	Lecture	1,2	Mid Term-2, Quiz & End Sem Exam
36	Seminar	Tutorial		Mid Term-2, Quiz & End Sem Exam
37	Report writing and presentation of data	Lecture	1,2	Mid Term-2, Quiz & End Sem Exam
38	Protocol	Lecture	1,2	Mid Term-2, Quiz & End Sem Exam
39	Cohorts studies	Lecture	1,4	Mid Term-2, Quiz & End Sem Exam
40	Unit test	Tutorial		Mid Term-2, Quiz & End Sem Exam
41	Observational studies	Lecture	1,4	Mid Term-2, Quiz



				& End Sem Exam
42	Experimental studies	Lecture	1,4	Mid Term-2, Quiz & End Sem Exam
43	Designing clinical trial and various phases	Lecture	4	Mid Term-2, Quiz & End Sem Exam
44	Seminar	Tutorial		Mid Term-2, Quiz & End Sem Exam
45	Blocking and confounding system for Two-level factorials	Lecture	5	Mid Term-2, Quiz & End Sem Exam
46	Blocking and confounding system for Two-level factorials	Lecture	5	Mid Term-2, Quiz & End Sem Exam
47	Blocking and confounding system for Two-level factorials	Lecture	2,5	Quiz & End Sem Exam
48	Quiz	Tutorial		Quiz & End Sem Exam
49	Statistical Analysis Using Excel	Lecture	1,3,5	Quiz & End Sem Exam
50	Statistical Analysis Using SPSS	Lecture	1,3,5	Quiz & End Sem Exam
51	Statistical Analysis Using Minitab	Lecture	1,3,5	Quiz & End Sem Exam
52	Group discussion on Blocking and confounding	Tutorial		Quiz & End Sem Exam
53	Statistical Analysis Using Design Expert	Lecture	1,3,5	Quiz & End Sem Exam
54	R -Online Statistical Software's to Industrial and Clinical trial approach	Lecture	1,3,5	Quiz & End Sem Exam
55	Definition, 2 <sup>2</sup> , 2 <sup>3</sup> design	Lecture	5	Quiz & End Sem Exam
56	Unit test	Tutorial		Quiz & End Sem Exam
57	Advantage of factorial design	Lecture	5	Quiz & End Sem Exam
58	Response surface methodology	Lecture	5	Quiz & End Sem Exam
59	Central composite design, Historical design and Optimization Techniques	Lecture	2,3	Quiz & End Sem Exam
60	Unit test	Tutorial		Quiz & End Sem Exam

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### I. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES	CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES
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		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11		P S O 1	P S O 2	P S O 3
<b>BP801T.1</b>	<b>BP801T.1.</b> Relate pharmacy education, and statistical analysis with in pharmaceutical research.	3	1	3	3	2	3	-	2	1	-	-		3	2	2
<b>BP801T.2.</b>	<b>BP801T.2.</b> Descriptive statistics, Graphics, Correlation, Regression, logistic regression Probability theory, Sampling technique, Parametric tests, Non Parametric tests, ANOVA.	3	1	3	3	2	3	-	2	-	-	-		3	3	2
<b>BP801T.3.</b>	<b>BP801T.3.</b> Design of Experiments, Phases of Clinical trials and Observational and Experimental studies.	3	1	3	3	2	3	-	2	2	-	-		3	2	2
<b>BP801T.4.</b>	<b>BP801T.4.</b> Introduction to SPSS, R and MINITAB statistical software's, analyzing the statistical data using Excel.	3	1	3	3	2	3	-	2	1	-	-		3	2	2
<b>BP801T.5.</b>	<b>BP801T.5.</b> Solve the calculation, and pharmaceutical research result analysis.	3	1	3	3	2	3	-	2	1	-	-		3	3	2

Sample Question Paper



Amity Institute of Pharmacy  
Department of Pharmaceutics  
I MID-SEMESTER (SEM –Ist) 2023-24

Class: B.Pharm, I Semester

Subject Name: BP103T Pharmaceutics-I Theory		Time: 1 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,2,3,4,5	Q.6,8,9	Q.2,8,9	Q.5,6,7	5,6,7	

The student will be able to

**CO1.** Acquire the skills to design, conduct, and critically evaluate clinical trials, observational studies, and experimental studies, ensuring appropriate statistical analysis for decision-making in pharmaceutical science.

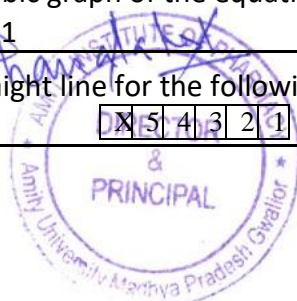
**CO2.** Apply descriptive statistics, correlation, regression, parametric, and non-parametric tests to analyze and interpret pharmaceutical data effectively.

**CO3.** Develop the ability to operate statistical software such as MS Excel, SPSS, R, and MINITAB® to perform data analysis and solve pharmaceutical-related problems.

**CO4.** Develop a solid understanding of probability theory and various sampling techniques, enabling them to design experiments and analyze data in pharmaceutical research and clinical trials.

**CO5.** Implement Design of Experiments (DoE) and perform ANOVA to optimize pharmaceutical processes and interpret experimental results.

CO Map	Question No.	Question	Marks						
CO1 & 4	Q.1	Assumptions of Binomial distribution.	2						
CO2	Q.2	Difference between parametric and non-parametric test.	2						
CO1	Q.3	Scatter diagram of correlation.	2						
CO5	Q.4	Blocking" is important in the factorial design.	2						
CO3 & 5	Q.5	Write about the Response Surface Methodology.	2						
CO1 & 2	Q.6	The equation of the two lines of regression are: $3x + 9y = 10$ and $3y + 8x = 4$ , then find (i) mean of $X$ and $Y$ series i.e. $\bar{X}$ and $\bar{Y}$ . (ii) both regression coefficient	10						
CO2 & 3	Q.7	Plot the cubic graph of the equation for $-2 \leq x \leq 2$ ; $y = x^3 - 3x^2 - 1$	10						
CO 2 & 3	Q.8	Fit the straight line for the following data: <table border="1" style="display: inline-table; margin-left: 20px;"> <tr> <td>X</td> <td>5</td> <td>4</td> <td>3</td> <td>2</td> <td>1</td> </tr> </table>	X	5	4	3	2	1	5
X	5	4	3	2	1				



		Y 1 2 3 4 5	
CO 4	Q.9	Write in details about the three-software used in the statistical analysis.	5
CO1, 2 & 4	Q.10	Discuss the hypothesis testing in simple linear regression.	5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**No Attainment Level:**

52.17 % Percentage of students secured more than 60% marks, so this course BIostatistics and Research Methodology (Theory) (BP801T) not attained any Level.

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AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACOLOGY

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**PROGRAMME ARTICULATION  
MATRIX**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11					
VIII SEM	BP802T	3	2	3	-	-	-	-	-	-	-	-		-	-	-	




# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

<b>DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING</b>
<b>Course Handout</b>
Course : Social and Préventive Pharmacy
Course Code BP802T, Crédits : 04, Session :2023-24 (Even Sem.), Class : B.Pharm. 4th Year
Faculty Name : Dr. P. Sagar

**A. Introduction:** Objectives of this course, the student shall be able to: • Acquire high consciousness/realization of current issues related to health and pharmaceutical problems within the country and worldwide. • Have a critical way of thinking based on current healthcare development. • Evaluate alternative ways of solving problems related to health and pharmaceutical issues

**B. Course Outcomes:** At the end of the course, students will be able to:

**BP802.1.** Understand the concept of public health and analyze the status of diseases in both Indian and international contexts.

**BP802.2.** Describe control measures for preventable diseases and assess strategies for disease prevention and management.

**BP802.3.** Explain the objectives, functioning, and outcomes of National Health Programs, emphasizing their impact on public health.

**BP802.4.** Discuss contemporary pharmacy practices and health-related issues, including emerging trends and challenges.

**BP802.5.** Understand the role of pharmacists in promoting health, and their contributions to general public well-being and health advocacy.

**C. Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.



**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.1]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

- 1. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.
- 2. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).
- 3. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.
- 4. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.



5. **The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.
6. **Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
7. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**D. Assessment Plan:**

<b>Component of Evaluation</b>	<b>Description</b>	<b>Code</b>	<b>Weightage %</b>
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2 (quiz, assignment, open book test, field work, group discussion and seminar)		
	Seminar/ Assignment/Quiz/ Open book test	S/As/Q/OBT	3%
Interaction	Student-Teacher interaction	ST	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>



## **E. Syllabus**

### **Unit I: 10 Hours**

Concept of health and disease: Definition, concepts and evaluation of public health. Understanding the concept of prevention and control of disease, social causes of diseases and social problems of the sick. Social and health education: Food in relation to nutrition and health, Balanced diet, Nutritional deficiencies, Vitamin deficiencies, Malnutrition and its prevention. Sociology and health: Socio cultural factors related to health and disease, Impact of urbanization on health and disease, Poverty and health Hygiene and health: personal hygiene and health care; avoidable habits.

### **Unit II: 10 Hours**

Preventive medicine: General principles of prevention and control of diseases such as cholera, SARS, Ebola virus, influenza, acute respiratory infections, malaria, chicken guinea, dengue, lymphatic filariasis, pneumonia, hypertension, diabetes mellitus, cancer, drug addiction-drug substance abuse

### **Unit III: 10 Hours**

National health programs, its objectives, functioning and outcome of the following: HIV AND AIDS control programme, TB, Integrated disease surveillance program (IDSP), National leprosy control programme, National mental health program, National 158 programme for prevention and control of deafness, Universal immunization programme, National programme for control of blindness, Pulse polio programme.

### **Unit IV: 08 Hours**

National health intervention programme for mother and child, National family welfare programme, National tobacco control programme, National Malaria Prevention Program, National programme for the health care for the elderly, Social health programme; role of WHO in Indian national program

### **Unit V: 07 Hours**

Community services in rural, urban and school health: Functions of PHC, Improvement in rural sanitation, national urban health mission, Health promotion and education in school.





**F. Examination Scheme:**

Components	A	ST	CT	S/As/Q/OBT	EE
Weightage (%)	4	3	15	3	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

**G. Suggested Text/Reference Books:**

- H.** 1. Short Textbook of Preventive and Social Medicine, Prabhakara GN, 2<sup>nd</sup> Edition, 2010, ISBN: 9789380704104, JAYPEE Publications
- I.** 2. Textbook of Preventive and Social Medicine (Mahajan and Gupta), Edited by Roy Rabindra Nath, Saha Indranil, 4<sup>th</sup> Edition, 2013, ISBN: 9789350901878, JAYPEE Publications
- J.** 3. Review of Preventive and Social Medicine (Including Biostatistics), Jain Vivek, 6<sup>th</sup> Edition, 2014, ISBN: 9789351522331, JAYPEE Publications 4. Essentials of Community Medicine—A Practical Approach, Hiremath Lalita D, Hiremath Dhananjaya A, 2<sup>nd</sup> Edition, 2012, ISBN: 9789350250440, JAYPEE Publications
- K.** 5. Park Textbook of Preventive and Social Medicine, K Park, 21<sup>st</sup> Edition, 2011, ISBN-14: 9788190128285, BANARSIDAS BHANOT PUBLISHERS. 6. Community Pharmacy Practice, Ramesh Adepu, BSP publishers, Hyderabad

**L. Lecture Plan**

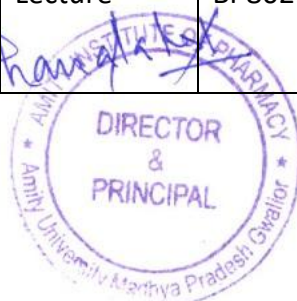
Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Definition,	Lecture	BP802.1	Mid Term-1, Quiz & End Sem Exam
2	concepts and evaluation of public health.	Lecture	BP802.1	Mid Term-1, Quiz & End Sem Exam
3	Understanding the concept of prevention and control of disease,	Lecture	BP802.1	Mid Term-1, Quiz & End Sem



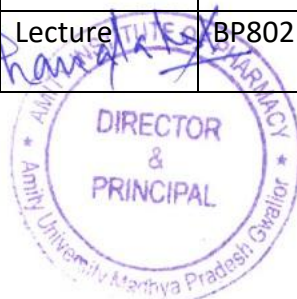
				Exam
4	<i>diseases and social problems of the sick.</i>	Lecture	BP802.1	Mid Term-1, Quiz & End Sem Exam
5	Social and health education: Food in relation to nutrition and health,	Lecture	BP802.1	Mid Term-1, Quiz & End Sem Exam
6	Balanced diet,	Lecture	BP802.1	Mid Term-1, Quiz & End Sem Exam
7	Nutritional deficiencies	Lecture	BP802.1	Mid Term-1, Quiz & End Sem Exam
8	Vitamin deficiencies,	Lecture	BP802.1	Mid Term-1, Quiz & End Sem Exam
9	Malnutrition and its prevention	Lecture	BP802.1	Mid Term-1, Quiz & End Sem Exam
10	Sociology and health: Socio cultural factors related to health and disease,.	Lecture	BP802.1	Mid Term-1, Quiz & End Sem Exam
11	Impact of urbanization on health and disease,	Lecture	BP802.1	Mid Term-1, Quiz & End Sem Exam
12	Poverty and health Hygiene and health:	Lecture	BP802.1	Mid Term-1, Quiz &



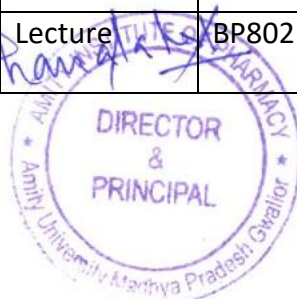
				End Sem Exam
13	personal hygiene and health care; avoidable habits	Lecture	BP802.1	Mid Term-1, Quiz & End Sem Exam
14	General principles of prevention and control of cholera	Lecture	BP802.2	Mid Term-1, Quiz & End Sem Exam
15	General principles of prevention and control of SARS,	Lecture	BP802.2	Mid Term-1, Quiz & End Sem Exam
16	General principles of prevention and control of Ebola virus,	Lecture	BP802.2	Mid Term-1, Quiz & End Sem Exam
17	General principles of prevention and control of influenza,	Lecture	BP802.2	Mid Term-1, Quiz & End Sem Exam
18	General principles of prevention and control of acute respiratory infections	Lecture	BP802.2	Mid Term-1, Quiz & End Sem Exam
19	General principles of prevention and control of malaria,	Lecture	BP802.2	Mid Term-1, Quiz & End Sem Exam
20	General principles of prevention and control of chicken guinea,	Lecture	BP802.2	Mid Term-1, Quiz & End Sem Exam
21	General principles of prevention and control of dengue,	Lecture	BP802.2	Mid Term-2, Quiz &



				End Sem Exam
22	General principles of prevention and control of lymphatic filariasis	Lecture	BP802.2	Mid Term-2, Quiz & End Sem Exam
23	General principles of prevention and control of pneumonia, ,	Lecture	BP802.2	Mid Term-2, Quiz & End Sem Exam
24	General principles of prevention and control of hypertension,	Lecture	BP802.2	Mid Term-2, Quiz & End Sem Exam
25	General principles of prevention and control of diabetes mellitus,	Lecture	BP802.2	Mid Term-2, Quiz & End Sem Exam
26	General principles of prevention and control of cancer	Lecture	BP802.2	Mid Term-2, Quiz & End Sem Exam
27	drug addiction- drug substance abuse	Lecture	BP802.2	Mid Term-2, Quiz & End Sem Exam
28	National health programs, its objectives, functioning and outcome of HIV AND AIDS control programme	Lecture	BP802.3	Mid Term-2, Quiz & End Sem Exam
29	National health programs, its objectives, functioning and outcome of TB	Lecture	BP802.3	Mid Term-2, Quiz & End Sem Exam
30	Integrated disease surveillance	Lecture	BP802.3	Mid Term-2,



	program (IDSP)			Quiz & End Sem Exam
31	National leprosy control programme	Lecture	BP802.3	Mid Term-2, Quiz & End Sem Exam
32	National mental health program	Lecture	BP802.3	Mid Term-2, Quiz & End Sem Exam
33	National 158 programme for prevention and control of deafness,	Lecture	BP802.3	Mid Term-2, Quiz & End Sem Exam
34	Universal immunization programme, National programme for control of blindness	Lecture	BP802.3	Mid Term-2, Quiz & End Sem Exam
35	Pulse polio programme.	Lecture	BP802.3	Mid Term-2, Quiz & End Sem Exam
36	National health intervention programme for mother and child,	Lecture	BP802.3	Mid Term-2, Quiz & End Sem Exam
37	National family welfare programme,	Lecture	BP802.3	Quiz & End Sem Exam
38	National tobacco control programme	Lecture	BP802.3	Quiz & End Sem Exam
39	National Malaria Prevention Program	Lecture	BP802.3	Quiz & End Sem Exam
40	Programme for the health care for	Lecture	BP802.3	Quiz & End Sem Exam



	the elderly			Exam
41	Social health programme; role of WHO in Indian national program	Lecture	BP802.4	Quiz & End Sem Exam
42	Community services in rural,	Lecture	BP802.4	Quiz & End Sem Exam
43	Community services in Urban	Lecture	BP802.4	Quiz & End Sem Exam
44	Functions of PHC	Lecture	BP802.4	Quiz & End Sem Exam
45	Improvement in rural sanitation,	Lecture	BP802.4	Quiz & End Sem Exam
46	National urban health mission	Lecture	BP802.4	Quiz & End Sem Exam
47	Health promotion and education in school.	Lecture	BP802.5	Quiz & End Sem Exam
48	Health promotion and education in school.	Lecture	BP802.5	Quiz & End Sem Exam

### M. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES										
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11

*A. Hirani*  


BP802.1	Understand the concept of public health and analyze the status of diseases in both Indian and international contexts.	3	3	1	2	1				1		2
BP802.2.	Describe control measures for preventable diseases and assess strategies for disease prevention and management.	3	3	1	3	2				2		2
BP802.3.	Explain the objectives, functioning, and outcomes of National Health Programs, emphasizing their impact on public health.	3	3	2	3	2				3		2
BP802.4.	Discuss contemporary pharmacy practices and health-related issues, including emerging trends and challenges.	3	3	2	2	2			2	2		2
BP802.5..	Understand the role of pharmacists in promoting health, and their contributions to general public well-being and health advocacy.	3	3	2	3	3			2	2		3

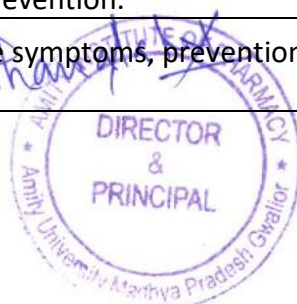
*A. Hirani*



DIRECTOR  
&  
PRINCIPAL

Sample Question Paper

Amity Institute of pharmacy Department of Pharmaceutical Chemistry II MID-SEMESTER (SEM –VIII) 2021-22						
Class: B.Pharmacy VIII Semester						
Subject Name: BP802T <b>SOCIAL AND PREVENTIVE PHARMACY</b>		Time: 1 Hr			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1, 3, 5, 7, 10	Q. 2, 3, 6, 8, 89	Q. 4	Q.		Q.
<p>Student will be</p> <p><b>CO1:</b> Discuss the concept of public health and diseases in Indian and International Scenario.</p> <p><b>CO2:</b> Explain the control measures for various preventable diseases.</p> <p><b>CO3:</b> Describe the objectives, functioning and outcome of various National Health Programmes.</p> <p><b>CO4:</b> Write about contemporary pharmacy and health-related concerns.</p> <p><b>CO5:</b> Explain the function of pharmacists in generalizing and promoting health.</p>						
CO Map	Question No.	Question				Marks
CO3	Q.1	Give the socio-cultural factors with respect to health and disease?				2
CO3	Q.2	Enumerate the etiology of malaria.				2
	Q.3	Define health.				2
CO5	Q.4	Compare between drug addiction and drug substance abuse.				2
CO4	Q.5	State on social health?				2
CO3	Q.6	Explain the general principles, prevention and control of elevated blood pressure and glucose levels conditions.				10
	Q.7	Give a note on the concept of health and disease.				10
CO3	Q.8	Describe the types of vitamin deficiency disorders and write its prevention.				5
CO3	Q.9	Explain the symptoms, prevention, and control measures of SARS.				5





CO5	Q 10	What is malnutrition and write its preventive measures.	5
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Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**Attainment below Level 1:**

58.7 % of students secured more than 60% marks, so this course SOCIAL AND PREVENTIVE PHARMACY - THEORY (BP802T) not attained any level.

*[Handwritten Signature]*





**AMITY UNIVERSITY MADHYA PRADESH, GWALIOR**

**AMITY INSTITUTE OF PHARMACY**

**DEPARTMENT OF PHARMACEUTICS**

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### **Programme Outcomes:**

**[PO.1].Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2].Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

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**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.



**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “- “



		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
VIII SEM	BP803ET	1	3	2	1	2	2	1	3	2	-	1	1	-	1

*[Handwritten Signature]*

**DIRECTOR & PRINCIPAL**

AMITY INSTITUTE OF PHARMACY  
 Amity University, Madhya Pradesh Gwalior



## DEPARTMENT OF PHARMACEUTICS

### Course Handout

Course : Pharma Marketing Management (Theory)

Course Code : BP803ET, Crédits : 04, Session : 2023-24 (Even Sem.), Class : B. Pharm. 4<sup>th</sup>Year

Faculty Name : Mr. Kapil Gupta

**A. Introduction:** Course enables the student to provide an understanding of marketing concepts and techniques and their applications in the pharmaceutical industry. The pharmaceutical industry not only needs highly qualified researchers, chemists and, technical people, but also requires skilled managers who can take the industry forward by managing and taking the complex decisions which are imperative for the growth of the industry. The knowledge and Know-how of marketing management groom the people for taking a challenging role in Sales and Product management. Upon completion of the course, the student shall be able to:

1. Know-how of marketing management grooms the people for taking a challenging role in Sales and Product management.
2. Know various methods of product promotions in the market for the pharmaceutical dosage forms and importance of public relations.
3. Know the pricing methods and strategies and the role of DPCO (Drug Price Control Order) and NPPA (National Pharmaceutical Pricing Authority)

**B. Course Outcomes:** At the end of the course, students will be able to understand:

**BP803ET.1.** Describe the concept of Market and Pharmaceutical Marketing.

**BP803ET.2.** Enumerate the concept of Product Management in Pharmaceutical Industry.

**BP803ET.3.** Discuss the various components of Promotion of Pharmaceutical Products and Public Relationship.

**BP803ET.4.** Discuss the roles Pharmaceutical Marketing Channels and Professional Sales Representative.

**BP803ET.5** Discuss the roles and responsibilities of various Pricing Authorities in India and their Regulations.

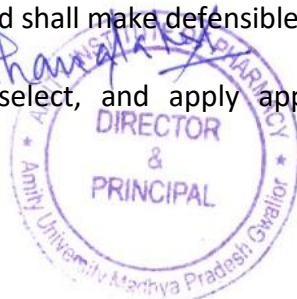
**C. Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Posses knowledge and compression of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

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**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

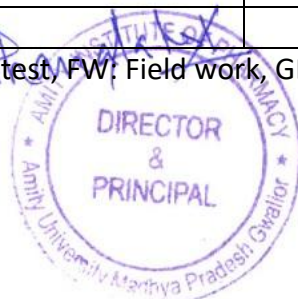
**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self- assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**D. Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	3%
	Student – Teacher interaction	S-T I	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves Including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

Q: Quiz, A: Assignment, OBT: Open book test, FW: Field work, GD: Group discussion, S: Seminar



## E. Syllabus

### Module I:

**Marketing:** Definition, general concepts and scope of marketing; Distinction between marketing & selling; Marketing environment; Industry and competitive analysis; Analyzing consumer buying behaviour; industrial buying behaviour.

**Pharmaceutical market:** Quantitative and qualitative aspects; size and composition of the market; demographic descriptions and socio-psychological characteristics of the consumer; market segmentation & targeting. Consumer profile; Motivation and prescribing habits of the physician; patients' choice of physician and retail pharmacist. Analyzing the Market; Role of market research.

### Module II:

**Product decision:** Classification, product line and product mix decisions, product life cycle, product portfolio analysis; product positioning; New product decisions; Product branding, packaging and labeling decisions, Product management in pharmaceutical industry.

### Module III:

**Promotion:** Methods, determinants of promotional mix, promotional budget; An overview of personal selling, advertising, direct mail, journals, sampling, retailing, medical exhibition, public relations, online promotional techniques for OTC Products.

### Module IV:

**Pharmaceutical marketing channels:** Designing channel, channel members, selecting the appropriate channel, conflict in channels, physical distribution management: Strategic importance, tasks in physical distribution management.

**Professional sales representative (PSR):** Duties of PSR, purpose of detailing, selection and training, supervising, norms for customer calls, motivating, evaluating, compensation and future prospects of the PSR.

### Module V:

**Pricing:** Meaning, importance, objectives, and determinants of price; pricing methods and strategies, issues in price management in pharmaceutical industry. An overview of DPCO (Drug Price Control Order) and NPPA (National Pharmaceutical Pricing Authority).

## F. Examination Scheme:

Components	CT	A	Q/A/OBT/FW/GD/S	STI	EE
Weightage (%)	15	4	3	3	75

Q: Quiz, A: Assignment, OBT: Open book test, FW: Field work, GD: Group discussion, S: Seminar, STI: Student – Teacher interaction

## G. Suggested Text/Reference Books:

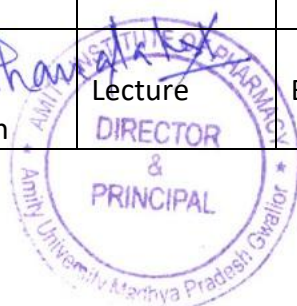
1. Philip Kotler and Kevin Lane Keller: Marketing Management, Prentice Hall of India, New Delhi
2. Walker, Boyd and Larreche : Marketing Strategy- Planning and Implementation, Tata McGrawHill, New Delhi.
3. Dhruv Grewal and Michael Levy: Marketing, Tata MC Graw Hill
4. Arun Kumar and N Menakshi : Marketing Management, Vikas Publishing, India



5. Rajan Saxena: Marketing Management; Tata MC Graw-Hill (India Edition)
6. Ramaswamy, U.S & Nanakamari, S: Marketing Management: Global Perspective, Indian Context, Macmillan India, New Delhi.
7. Shanker, Ravi: Service Marketing, Excell Books, New Delhi
8. Subba Rao Changanti, Pharmaceutical Marketing in India (GIFT – Excel series) Excel Publications.

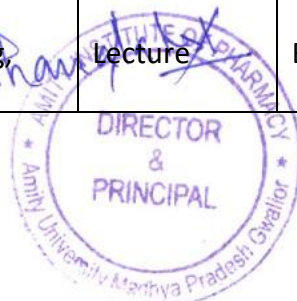
#### H. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1.	Marketing: Definition	Lecture	BP803ET.1	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
2.	General concepts and scope of marketing;	Lecture	BP803ET.1	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
3.	Distinction between marketing & selling; Marketing environment;	Lecture	BP803ET.1	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
4.	Tutorial 1	Tutorial 1	BP803ET.1	
5.	Industry and competitive analysis;	Lecture	BP803ET.1	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
6.	Analyzing consumer buying behavior; industrial buying behavior.	Lecture	BP803ET.1	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
7.	Pharmaceutical Market: Quantitative and qualitative aspects;	Lecture	BP803ET.1	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
8.	Tutorial 2	Tutorial 2	BP803ET.1	
9.	Size and composition of the market; demographic descriptions and socio-psychological characteristics of the consumer;	Lecture	BP803ET.1	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
10.	Market Segmentation & targeting. Consumer profile;	Lecture	BP803ET.1	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
11.	Motivation and Prescribing habits of the physician; patients' choice of physician	Lecture	BP803ET.1	Mid Term-1, Quiz/ Assignment/Open book test/& End

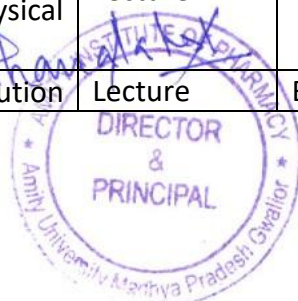




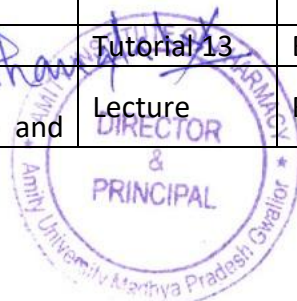
	and retail pharmacist. Analyzing the Market; Role of market research.			Sem Exam
12.	Tutorial 3	Tutorial 3	BP803ET.1	
13.	Product decision: Classification	Lecture	BP803ET.2	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
14.	Product line and product mix decisions,	Lecture	BP803ET.2	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
15.	Product life cycle, product portfolio analysis; product positioning;	Lecture	BP803ET.2	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
16.	Tutorial 4	Tutorial 4	BP803ET.2	
17.	New product decisions;	Lecture	BP803ET.2	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
18.	Product branding	Lecture	BP803ET.2	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
19.	Packaging and labeling decisions	Lecture	BP803ET.2	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
20.	Tutorial 5	Tutorial 5	BP803ET.2	
21.	Product management in pharmaceutical industry.	Lecture	BP803ET.2	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
22.	Promotion: Methods	Lecture	BP803ET.3	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
23.	Determinants of promotional mix, promotional budget	Lecture	BP803ET.3	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
24.	Tutorial 6	Tutorial 6	BP803ET.3	
25.	An overview of personal selling, advertising,	Lecture	BP803ET.3	Mid Term-1, Quiz/ Assignment/Ope



				n book test/& End Sem Exam
26.	Direct mail, journals, sampling, retailing,	Lecture	BP803ET.3	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
27.	Medical Exhibition,	Lecture	BP803ET.3	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
28.	Tutorial 7	Tutorial 7	BP803ET.3	
29.	Public Relations,	Lecture	BP803ET.3	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
30.	Online promotional techniques for OTC Products.	Lecture	BP803ET.3	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
31.	Online promotional techniques for OTC Products.	Lecture	BP803ET.3	Mid Term-1, Quiz/ Assignment/Open book test/& End Sem Exam
32.	Tutorial 8	Tutorial 8	BP803ET.3	
33.	Pharmaceutical Marketing channels:	Lecture	BP803ET.4	Mid Term-2, Quiz/ Assignment/Open book test/& End Sem Exam
34.	Designing channel, channel members,	Lecture	BP803ET.4	Mid Term-2, Quiz/ Assignment/Open book test/& End Sem Exam
35.	Selecting the appropriate channel, conflict in channels,	Lecture	BP803ET.4	Mid Term-2, Quiz/ Assignment/Open book test/& End Sem Exam
36.	Tutorial 9	Tutorial 9	BP803ET.4	
37.	Physical distribution management: Strategic importance, tasks in physical distribution management.	Lecture	BP803ET.4	Mid Term-2, Quiz/ Assignment/Open book test/& End Sem Exam
38.	Physical distribution	Lecture	BP803ET.4	Mid Term-2, Quiz/



	management: Strategic importance, tasks in physical distribution management.			Assignment/Open book test/& End Sem Exam
39.	Physical distribution management: Strategic importance, tasks in physical distribution management.	Lecture	BP803ET.4	Mid Term-2, Quiz/ Assignment/Open book test/& End Sem Exam
40.	Tutorial 10	Tutorial 10		
41.	Professional sales representative (PSR): Duties of PSR,	Lecture	BP803ET.4	Mid Term-2, Quiz/ Assignment/Open book test/& End Sem Exam
42.	Purpose of detailing, selection and training, supervising,	Lecture	BP803ET.4	Mid Term-2, Quiz/ Assignment/Open book test/& End Sem Exam
43.	Norms for customer calls, motivating, evaluating, compensation and future prospects of the PSR.	Lecture	BP803ET.4	Mid Term-2, Quiz/ Assignment/Open book test/& End Sem Exam
44.	Tutorial 11	Tutorial 11		
45.	Norms for customer calls, motivating, evaluating, compensation and future prospects of the PSR.	Lecture	BP803ET.4	Mid Term-2, Quiz/ Assignment/Open book test/& End Sem Exam
46.	Norms for customer calls, motivating, evaluating, compensation and future prospects of the PSR.	Lecture	BP803ET.4	Mid Term-2, Quiz/ Assignment/Open book test/& End Sem Exam
47.	Norms for customer calls, motivating, evaluating, compensation and future prospects of the PSR.	Lecture	BP803ET.4	Mid Term-2, Quiz/ Assignment/Open book test/& End Sem Exam
48.	Tutorial 12	Tutorial 12		
49.	Pricing: Meaning, importance, objectives, determinants of price; pricing methods and strategies	Lecture	BP803ET.5	Mid Term-2, Quiz/ Assignment/Open book test/& End Sem Exam
50.	Pricing: Meaning, importance, objectives, determinants of price; pricing methods and strategies	Lecture	BP803ET.5	Mid Term-2, Quiz/ Assignment/Open book test/& End Sem Exam
51.	Issues in price management in pharmaceutical industry	Lecture	BP803ET.5	Mid Term-2, Quiz/ Assignment/Open book test/& End Sem Exam
52.	Tutorial 13	Tutorial 13	BP803ET.5	
53.	An overview of DPCO (Drug Price Control Order) and	Lecture	BP803ET.5	Mid Term-2, Quiz/ Assignment/Open



	NPPA (National Pharmaceutical Pricing Authority).			book test/& End Sem Exam
54.	An overview of DPCO (Drug Price Control Order) and NPPA (National Pharmaceutical Pricing Authority).	Lecture	BP803ET.5	Mid Term-2, Quiz/Assignment/Open book test/& End Sem Exam
55.	Emerging concepts in marketing: Vertical& Horizontal Marketing	Lecture	BP803ET.5	Mid Term-2, Quiz/Assignment/Open book test/& End Sem Exam
56.	Tutorial 14	Tutorial 14	BP803ET.5	
57.	Emerging concepts in marketing: Vertical& Horizontal Marketing	Lecture	BP803ET.5	Mid Term-2, Quiz/Assignment/Open book test/& End Sem Exam
58.	Rural Marketing; Consumerism; Industrial Marketing; Global Marketing.	Lecture	BP803ET.5	Mid Term-2, Quiz/Assignment/Open book test/& End Sem Exam
59.	Rural Marketing; Consumerism; Industrial Marketing; Global Marketing.	Lecture	BP803ET.5	Mid Term-2, Quiz/Assignment/Open book test/& End Sem Exam
60.	Tutorial 15	Tutorial 15	BP803ET.5	

#### I. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES											CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
BP803ET. 1	Describe the concept of marketing and Pharmaceutical Marketing.	1	3	3	3	3	2	1	2	2	1	2	-	1	1	
BP803ET. 2	Enumerate the concept of product management in Pharmaceutical Industry.	1	2	3	3	3	3	1	2	1	1	2	-	-	-	
BP803ET. 3	Discuss the various components of promotion of pharmaceutical products and public relations.	1	2	3	3	3	3	1	2	1	1	2	1	1	-	
BP803ET.4	Discuss the roles pharmaceutical marketing channels and professional sales representative.	1	2	3	3	3	3	1	2	1	1	2	1	1	-	



<b>BP803ET.5</b>	Discuss the roles and responsibilities of pricing authorities in India.	1	2	3	2	2	3	2	2	2	1	2	-	-	-
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*[Handwritten Signature]*  


## Sample Question Paper

Amity Institute of Pharmacy Department of Pharmaceutics I MID-SEMESTER (SEM–VIII) 2023-24						
Class: B. Pharm VIII Semester						
Subject Name : Pharma Marketing Management- Theory		Time: 1Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q. 1,2,7,10	Q. 3,5	Q. 4,6,8	Q. 9		
Student will be able to CO1: Describe the concept of marketing and pharmaceutical marketing. CO2: Enumerate the concept of product management in pharmaceutical industry. CO3: Discuss the various components of promotion of pharmaceutical products and public relations.						
CO Map	Question No.	Question				Marks
CO1	Q.1	List the main roles of market research.				2
CO1	Q.2	Name the 4 P's of marketing.				2
CO1	Q.3	Differentiate between marketing and selling.				2
CO2	Q.4	List out the objectives of product planning in Pharmaceutical marketing.				2
CO3	Q.5	Outline objectives of promotion.				2
CO1	Q.6	Explain overview of qualitative and quantitative aspects, size and composition of Indian Pharmaceutical market.				10
CO2	Q.7	What is Product Life cycle? Discuss the various stages of Product life cycle.				
CO1	Q.8	Write a note on pharmaceutical market segmentation.				5
CO1	Q.9	Explain the stages involved in market research.				5
CO2	Q.10	What are the effects of various elements of marketing mix on different stages of PLC?				5



Attainments		Rubric
Level	1	If 60% of students secure more than 60% marks then level 1
Level	2	If 70% of students secure more than 60% marks then level 2
Level	3	If 80% of students secure more than 60% marks then level 3

**Attainment Level:**

52.6 % of students secured more than 60% marks, in this course PHARMA  
MARKETING MANAGEMENT (BP803ET)





# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICS

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

### Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### Programme Outcomes:

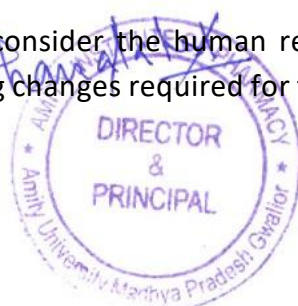
**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and





societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “- “



**PROGRAMME ARTICULATION  
MATRIX**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
VIII SEM	BP804 ET	3	1	2	-	3	3	2	1	3	-	-		3	2	3

*H. H. H. H.*

AMITY INSTITUTE OF PHARMACY  
\* AMITY UNIVERSITY, MATHYA PRADESH, GWALIOR \*

DIRECTOR  
&  
PRINCIPAL



<b>DEPARTMENT OF PHARMACEUTICS</b>
<b>Course Handout</b>
<b>Course: PHARMACEUTICAL REGULATORY SCIENCE THEORY</b>
Course Code : BP804ET, Crédits : 04, Session :2023-24 (Even Sem.), Class : B.Pharm. 4th Year
Faculty Name: Dr. Wasim Akram

**A. Introduction:** This course is designed to impart basic knowledge on important legislations related to the profession of pharmacy

**B. Course Outcomes:** At the end of the course, students will be able to:

**BP804ET.1:** Explain the process of drug discovery, development and generic product development

**BP804ET.2:** Describe the regulatory approval process and registration procedures for API and drug products in various countries

**BP804ET.3:** Learn the basic understanding of regulations of India with other global regulated markets

**BP804ET.4:** Understand the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals

**BP804ET.5:** Explain basic understanding of developing clinical trial protocols

**BP804ET.6:** Understand the concept of pharmacovigilance and its significance

**BP804ET.7:** Learn the basic understanding the importance of Orange book, Federal Register, Code of Federal Regulatory, and Purple book

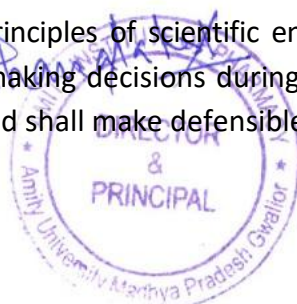
**BP804ET.8:** Explain the Registration of Indian drug product in overseas market

**C. Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.



**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**D. Programme Specific Outcomes:**

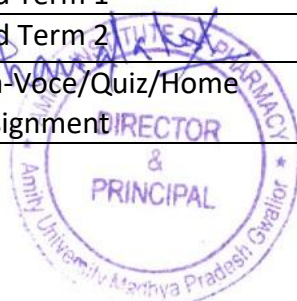
**PSO 1:** Will be able to design, develop and implement efficient software for a given real-life problem.

**PSO 2:** Will be able to apply knowledge of AI, Machine Learning and Data Mining in analyzing big data forextracting useful information from it and for performing predictive analysis.

**PSO 3:** Will be able to design, manage and secure wired/ wireless computer networks for transfer and sharing of information.

**E. Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	3%



	Student – Teacher interaction	S-T I	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

## F. Syllabus

### UNIT I

New Drug Discovery and development Stages of drug discovery, Drug development process, pre-clinical studies, non-clinical activities, clinical studies, Innovator and generics, Concept of generics, Generic drug product development.

### UNIT II

#### Regulatory Approval Process

Approval processes and timelines involved in Investigational New Drug (IND), New Drug Application (NDA), Abbreviated New Drug Application (ANDA). Changes to an approved NDA / ANDA.

#### Regulatory authorities and agencies

Overview of regulatory authorities of India, United States, European Union, Australia, Japan, Canada (Organization structure and types of applications)

### UNIT III

#### Registration of Indian drug product in overseas market

Procedure for export of pharmaceutical products, Technical documentation, Drug Master Files (DMF), Common Technical Document (CTD), electronic Common Technical, Document (eCTD), ASEAN Common Technical Document (ACTD) research.

### UNIT IV

#### Clinical trials

Developing clinical trial protocols, Institutional Review Board / Independent Ethics committee - formation and working procedures, Informed consent process and procedures, GCP obligations of Investigators, sponsors & Monitors, Managing and Monitoring clinical trials, Pharmacovigilance - safety monitoring in clinical trials

### UNIT V

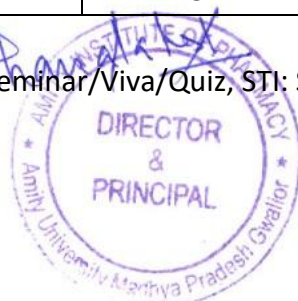
#### Regulatory Concepts

Basic terminology, guidance, guidelines, regulations, Laws and Acts, Orange book, Federal Register, Code of Federal Regulatory, Purple book

## G. Examination Scheme:

Components	A	CT	S/V/Q/HA	STI	EE
Weightage (%)	4	15	3	3	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination; A: Attendance

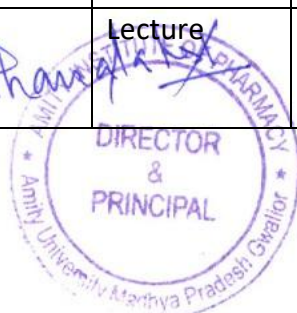


## H. Suggested Text/Reference Books:

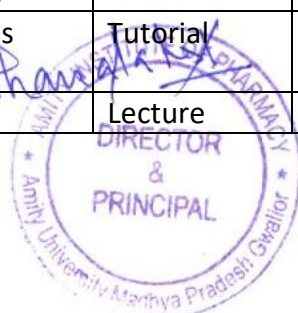
1. Drug Regulatory Affairs by Sachin Itkar, Dr. N.S. Vyawahare, Nirali Prakashan.
2. The Pharmaceutical Regulatory Process, Second Edition Edited by Ira R. Berry and Robert P. Martin, Drugs and the Pharmaceutical Sciences, Vol.185. Informa Health care Publishers.
3. New Drug Approval Process: Accelerating Global Registrations By Richard A Guarino, MD, 5th edition, Drugs and the Pharmaceutical Sciences, Vol.190.
4. Guidebook for drug regulatory submissions / Sandy Weinberg. By John Wiley & Sons. Inc.
5. FDA Regulatory Affairs: a guide for prescription drugs, medical devices, and biologics /edited by Douglas J. Pisano, David Mantus.
6. Generic Drug Product Development, Solid Oral Dosage forms, Leon Shargel and Isader Kaufer, Marcel Dekker series, Vol.143
7. Clinical Trials and Human Research: A Practical Guide to Regulatory Compliance By Fay A. Rozovsky and Rodney K. Adams
8. Principles and Practices of Clinical Research, Second Edition Edited by John I. Gallin and Frederick P. Ognibene
9. Drugs: From Discovery to Approval, Second Edition By Rick Ng

## I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	<b>New Drug Discovery and development</b> Stages of drug discovery	Lecture	1	Mid Term-1, Quiz & End Sem Exam
2	Drug development process,	Lecture	1	Mid Term-1, Quiz & End Sem Exam
3	pre-clinical studies	Lecture	1	Mid Term-1, Quiz & End Sem Exam
4	Doubt clearing session	Tutorial	1	Mid Term-1, Quiz & End Sem Exam
5	pre-clinical studies	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
6	non-clinical activities	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
7	clinical studies	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
8	Revision of completed topics	Tutorial	1,2	Mid Term-1, Quiz & End Sem Exam
9	clinical studies	Lecture	3	Mid Term-1, Quiz & End Sem Exam
10	Innovator and generics	Lecture	3	Mid Term-1, Quiz & End Sem Exam
11	Concept of generics, Generic drug product development.	Lecture	3	Mid Term-1, Quiz & End Sem Exam
12	Discussion on generics	Tutorial	3	Mid Term-1, Quiz & End Sem Exam
13	<b>Regulatory Approval Process</b> Approval processes	Lecture	1	Mid Term-1, Quiz & End Sem Exam



14	timelines involved in Investigational New Drug (IND)	Lecture	3,4,8	Mid Term-1, Quiz & End Sem Exam
15	New Drug Application (NDA)	Lecture	3,4,8	Mid Term-1, Quiz & End Sem Exam
16	Class test	Tutorial	3,4,8	Mid Term-1, Quiz & End Sem Exam
17	Abbreviated New Drug Application (ANDA)	Lecture	3,4,8	Mid Term-1, Quiz & End Sem Exam
18	Changes to an approved NDA / ANDA.	Lecture	3,4,8	Mid Term-1, Quiz & End Sem Exam
19	Regulatory authorities and agencies (Organization structure and types of applications) Overview of regulatory authorities of India	Lecture	3,4,8	Mid Term-1, Quiz & End Sem Exam
20	Seminar on all regulatory authorities	Tutorial	3,4,8	Mid Term-1, Quiz & End Sem Exam
21	Overview of regulatory authorities of United States	Lecture	3,4,8	Mid Term-1, Quiz & End Sem Exam
22	Overview of regulatory authorities of European Union	Lecture	3,4,8	Mid Term-1, Quiz & End Sem Exam
23	regulatory authorities of Australia, Japan,	Lecture	3,4,8	Mid Term-1, Quiz & End Sem Exam
24	Quiz	Tutorial	3,4,8	Mid Term-1, Quiz & End Sem Exam
25	regulatory authorities of Canada	Lecture	8	Mid Term-1, Quiz & End Sem Exam
26	<b>Registration of Indian drug product in overseas market</b>	Lecture	8	Mid Term-1, Quiz & End Sem Exam
27	Procedure for export of pharmaceutical products	Lecture	4,	Mid Term-1, Quiz & End Sem Exam
28	Revision	Tutorial	3,6,8,4	Mid Term-1, Quiz & End Sem Exam
29	Technical documentation,	Lecture	2,8	Mid Term-1, Quiz & End Sem Exam
30	Drug Master Files (DMF),	Lecture	2,8	Mid Term-1, Quiz & End Sem Exam
31	Common Technical Document (CTD)	Lecture	2,8	Mid Term-2, Quiz & End Sem Exam
32	Seminar	Tutorial	2,8	Mid Term-2, Quiz & End Sem Exam
33	electronic Common Technical Document (eCTD),	Lecture	8	Mid Term-2, Quiz & End Sem Exam
34	electronic Common Technical Document (eCTD),	Lecture	8	Mid Term-2, Quiz & End Sem Exam
35	ASEAN Common Technical Document (ACTD)research.	Lecture	8	Mid Term-2, Quiz & End Sem Exam
36	Group discussion on various types of documentation	Tutorial	2,8	Mid Term-2, Quiz & End Sem Exam
37	ASEAN Common Technical	Lecture	2,8	Mid Term-2, Quiz



	Document (ACTD)research.			& End Sem Exam
38	Clinical trials Developing clinical trial protocols	Lecture	2,8	Mid Term-2, Quiz & End Sem Exam
39	formation and working procedures	Lecture	2,8	Mid Term-2, Quiz & End Sem Exam
40	Seminar	Tutorial	2,8	Mid Term-2, Quiz & End Sem Exam
41	Informed consent process and procedures	Lecture	5	Mid Term-2, Quiz & End Sem Exam
42	GCP obligations of Investigators	Lecture	5	Mid Term-2, Quiz & End Sem Exam
43	sponsors & Monitor	Lecture	5	Mid Term-2, Quiz & End Sem Exam
44	Revision class	Tutorial	4,5	Mid Term-2, Quiz & End Sem Exam
45	Managing and Monitoring clinical trials	Lecture	5	Mid Term-2, Quiz & End Sem Exam
46	Pharmacovigilance - safety monitoring in clinical trials	Lecture	6	Mid Term-2, Quiz & End Sem Exam
47	Pharmacovigilance - safety monitoring in clinical trials	Lecture	6	Quiz & End Sem Exam
48	Doubt clearing session	Tutorial	6	Quiz & End Sem Exam
49	Regulatory Concepts Basic terminology	Lecture	3,4	Quiz & End Sem Exam
50	guidance,	Lecture	3,4	Quiz & End Sem Exam
51	guidelines	Lecture	3,4	Quiz & End Sem Exam
52	Quiz	Tutorial	8	Quiz & End Sem Exam
53	guidelines	Lecture	7	Quiz & End Sem Exam
54	regulations, Laws and Acts	Lecture	7	Quiz & End Sem Exam
55	Orange book	Lecture	7	Quiz & End Sem Exam
56	Class test	Tutorial	7	Quiz & End Sem Exam
57	Federal Register	Lecture	7	Quiz & End Sem Exam
58	Code of Federal Regulatory	Lecture	7	Quiz & End Sem Exam
59	Purple book	Lecture	7	Quiz & End Sem Exam
60	Class test	Tutorial	1,2,3,4,5,6	Quiz & End Sem Exam





**J. Course Articulation Matrix (Mapping of COs with POs)**

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES											CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
<b>BP80 4ET.1</b>	Explain the process of drug discovery, development and generic product development	3	2	-	-	-	1	3	-	2	-	-	-	2	2	3
<b>BP80 4ET.2.</b>	Describe the regulatory approval process and registration procedures for API and drug products in various countries	3	2	3	-	-	3	1	-	1	-	-	-	1	2	2
<b>BP80 4ET.3.</b>	Learn the basic understanding of regulations of India with other global regulated markets	3	-	3	-	1	3	3	-	2	-	-	-	3	2	3
<b>BP80 4ET.4.</b>	Understand the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals	3	-	2	-	2	3	2	-	1	-	-	-	2	2	3
<b>BP80 4ET.5.</b>	Explain basic understanding of developing clinical trial protocols	3	2	3	-	1	2	3	2	1	-	-	-	3	1	2
<b>BP80 4ET.6.</b>	Understand the concept of pharmacovigilance and its significance	3	-	3	-	-	3	3	3	3	-	-	-	1	2	2
<b>BP80 4ET.7</b>	Learn the basic understanding the importance of Orange book, Federal Register, Code of Federal Regulatory, and Purple book	3	1	1	-	-	3	-	3	2	-	-	-	3	2	3


  
 DIRECTOR & PRINCIPAL

<b>BP80 4ET.8</b>	Explain the Registration of Indian drug product in overseas market	3	3	3	-	2	3	2	2	3	-	-	3	3	3
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**Sample Question Paper**

Amity Institute of Pharmacy Department of Pharmaceutics I MID-SEMESTER (SEM –VIIIth) 2023-24						
Class: B.Pharm, VIIIth Semester						
Subject Name: BP804ET PHARMACEUTICAL REGULATORY SCIENCE- Theory		Time: 1 Hr			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1, 2, 7,9, 10	Q.3,6	Q. 5	Q. 4,8		
Student will be able to CO1: List the broad perceptive of cloud architecture and model. CO2: Apply different cloud programming models as per need.						
CO Map	Question No.	Question				Marks
CO1	Q.1	Write a note on the pre-clinical study.				2
CO1	Q.2	Define INDA.				2
CO1	Q.3	Write the name of the Regulatory Authority of Australia & Japan.				2
CO2	Q.4	Discuss the concept of generic.				2
CO1 CO3	Q.5	Define the Waxman-Hatch Act.				2
	Q.6	Compare the documentation requirements of NDA submissions. How innovator drug is different from generic drugs.				10
CO4	Q.7	Explain different stages of drug discovery & drug development.				10
CO3	Q.8	What are the different types of DMF? Discuss in detail.				5
CO3	Q.9	Highlight the organization and functions of Canadian drug regulatory bodies				5
CO5	Q.10	Differentiate innovator and generic products.				5


Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**Attainment below Level 2:**

79.2 % of students secured more than 60% marks, so this course PHARMACEUTICAL REGULATORY SCIENCE (BP804ET) attainment is level 2

*A. H. H. H.*



DIRECTOR  
&  
PRINCIPAL

*[Handwritten Signature]*





AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACOLOGY

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### Programme Outcomes:

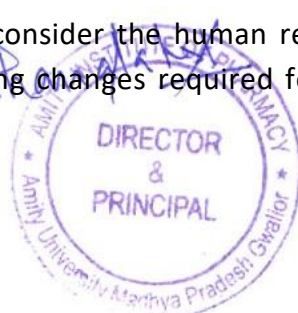
**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional



and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “- “



		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
VIII SEM	BP805E T	3	2	3	4	1	3	2	1	3	1	3	-	2	2
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*H. H. H. H. H.*

AMITY INSTITUTE OF PHARMACY  
 DIRECTOR  
 &  
 PRINCIPAL  
 Amity University, Mathya Pradesh Gwalior



# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

<b>DEPARTMENT OF PHARMACOLOGY</b>
<b>Course Handout</b>
Course : PHARMACOVIGILANCE -THEORY
Course Code : BP805ET, Crédits : 04, Session : 2023-24 (Even Sem.), Class : B.Pharm. 4TH Year
Faculty Name: Dr. Vikas Pandey

- A. Introduction:** This subject is designed to learn about development of pharmacovigilance as a science, basic terminologies used in pharmacovigilance, global scenario of Pharmacovigilance, train students on establishing pharmacovigilance programme in an organization, various methods that can be used to generate safety data and signal detection.
- B. Course Outcomes:** At the end of the course, students will be able to explain:

**BP805ET.1.** Detecting ADRS prevention of ADRS and assesment of ADRS

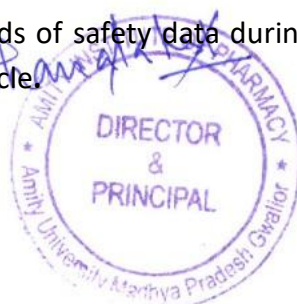
**BP805ET.2** Understanding the national and international scenario of pharmacovigilance

**BP805ET.3** Understand detection and assessment of new adverse drug reactions, Adverse drug reaction reporting systems and communication in pharmacovigilance, PV Program of India (PvPI) requirement for ADR reporting in India ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilance planning. CIOMS requirements for ADR reporting.

**BP805ET.4** Know the various methods used for reporting ADRs

**BP805ET.5** Understand the International standards for classification of diseases and drugs

**BP805ET.6** Comprehend methods of safety data during preclinical, clinical and post approval phases of drugs' life cycle.





### C. Programme Outcomes:

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

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**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

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**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.



**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**D. Assessment Plan:**

<b>Component of Evaluation</b>	<b>Description</b>	<b>Code</b>	<b>Weightage %</b>
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	3%
	Student – Teacher interaction	S-T I	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

**E. Syllabus**

**Unit I**

**Introduction to Pharmacovigilance**

- History and development of Pharmacovigilance
- Importance of safety monitoring of Medicine
- WHO international drug monitoring programme



- Pharmacovigilance Program of India(PvPI)

### **Introduction to adverse drug reactions**

- Definitions and classification of ADRs
- Detection and reporting
- Methods in Causality assessment
- Severity and seriousness assessment
- Predictability and preventability assessment
- Management of adverse drug reactions

### **Basic terminologies used in pharmacovigilance**

- Terminologies of adverse medication related events
- Regulatory terminologies

## **Unit II**

### **Drug and disease classification**

- Anatomical, therapeutic and chemical classification of drugs
- International classification of diseases
- Daily defined doses
- International Non proprietary Names for drugs

### **Drug dictionaries and coding in pharmacovigilance**

- WHO adverse reaction terminologies
- MedDRA and Standardised MedDRA queries
- WHO drug dictionary
- Eudravigilance medicinal product dictionary

### **Information resources in pharmacovigilance**

- Basic drug information resources
- Specialised resources for ADRs

### **Establishing pharmacovigilance programme**

- Establishing in a hospital
- Establishment & operation of drug safety department in industry
- Contract Research Organisations (CROs)
- Establishing a national programme

## **Unit III**

### **Vaccine safety surveillance**

- Vaccine Pharmacovigilance
- Vaccination failure
- Adverse events following immunization

### **Pharmacovigilance methods**

- Passive surveillance – Spontaneous reports and case series
- Stimulated reporting
- Active surveillance – Sentinel sites, drug event monitoring and registries
- Comparative observational studies – Cross sectional study, case control study and cohort study
- Targeted clinical investigations

### **Communication in pharmacovigilance**



- Effective communication in Pharmacovigilance
- Communication in Drug Safety Crisis management
- Communicating with Regulatory Agencies, Business Partners, Healthcare facilities & Media

#### Unit IV

##### Safety data generation

- Pre clinical phase
- Clinical phase
- Post approval phase (PMS)

##### ICH Guidelines for Pharmacovigilance

- Organization and objectives of ICH
- Expedited reporting
- Individual case safety reports
- Periodic safety update reports
- Post approval expedited reporting
- Pharmacovigilance planning
- Good clinical practice in pharmacovigilance studies

#### Unit V

##### Pharmacogenomics of adverse drug reactions

- Genetics related ADR with example focusing PK parameters.

##### Drug safety evaluation in special population

- Paediatrics
- Pregnancy and lactation
- Geriatrics

##### CIOMS

- CIOMS Working Groups
- CIOMS Form

##### CDSO (India) and Pharmacovigilance

- D&C Act and Schedule Y
- Differences in Indian and global pharmacovigilance requirements

#### F. Examination Scheme:

Components	A	CT	S/V/Q/HA	STI	EE
Weightage (%)	4	15	3	3	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination; A: Attendance

#### G. Suggested Text/Reference Books:

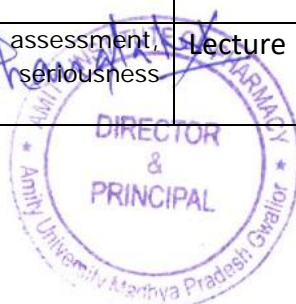
1. Textbook of Pharmacovigilance: S K Gupta, Jaypee Brothers, Medical Publishers.



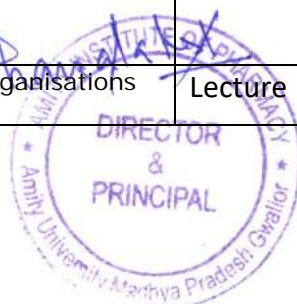
2. Practical Drug Safety from A to Z By Barton Cobert, Pierre Biron, Jones and Bartlett Publishers.
3. Mann's Pharmacovigilance: Elizabeth B. Andrews, Nicholas, Wiley Publishers.
4. Stephens' Detection of New Adverse Drug Reactions: John Talbot, Patrick Walle, Wiley Publishers.
5. An Introduction to Pharmacovigilance: Patrick Waller, Wiley Publishers.
6. Cobert's Manual of Drug Safety and Pharmacovigilance: Barton Cobert, Jones & Bartlett Publishers.
7. Textbook of Pharmacoepidemiology edited by Brian L. Strom, Stephen E Kimmel, Sean Hennessy, Wiley Publishers.
8. A Textbook of Clinical Pharmacy Practice -Essential Concepts and Skills: G. Parthasarathi, Karin Nyfort Hansen, Milap C. Nahata
9. National Formulary of India
10. Text Book of Medicine by Yashpal Munjal
11. Text book of Pharmacovigilance: concept and practice by GP Mohanta and PK Manna

#### A. Lecture Plan

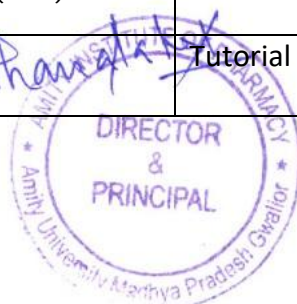
Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	History and development of Pharmacovigilance	Lecture	2	Mid Term-1, Quiz/Assignment & End Sem Exam
2	Importance of safety monitoring of Medicine	Lecture	1	Mid Term-1, Quiz/Assignment & End Sem Exam
3	WHO international drug monitoring programme Pharmacovigilance Program of India (PvPI)	Lecture	3	Mid Term-1, Quiz/Assignment & End Sem Exam
4	Tutorial 1	Tutorial	3	Mid Term-1, Quiz/Assignment & End Sem Exam
5	Introduction to adverse drug reactions, Definitions and classification of ADRs, Detection and reporting	Lecture	1	Mid Term-1, Quiz/Assignment & End Sem Exam
6	Methods in Causality assessment, Severity and seriousness assessment	Lecture	3	Mid Term-1, Quiz/Assignment



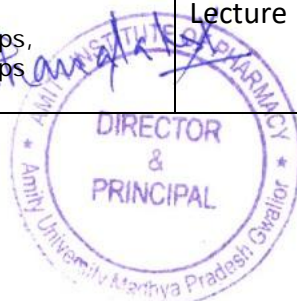
				& End Sem Exam
7	Severity and seriousness assessment, Management of adverse drug reactions	Lecture	3	Mid Term-1, Quiz/Assignment & End Sem Exam
8	Tutorial 2	Tutorial	1	Mid Term-1, Quiz/Assignment & End Sem Exam
9	Terminologies of adverse medication related events, Regulatory terminologies	Lecture	2	Mid Term-1, Quiz/Assignment & End Sem Exam
10	Anatomical, therapeutic and chemical classification of drugs	Lecture	5	Mid Term-1, Quiz/Assignment & End Sem Exam
11	Anatomical, therapeutic and chemical classification of drugs	Lecture	5	Mid Term-1, Quiz/Assignment & End Sem Exam
12	Tutorial 3	Tutorial	5	Mid Term-1, Quiz/Assignment & End Sem Exam
13	Daily defined doses, International Non proprietary Names for drugs	Lecture	5	Mid Term-1, Quiz/Assignment & End Sem Exam
14	WHO adverse reaction terminologies	Lecture	2	Mid Term-1, Quiz/Assignment & End Sem Exam
15	MedDRA and Standardised MedDRA queries WHO drug dictionary Eudravigilance medicinal product dictionary	Lecture	2	Mid Term-1, Quiz/Assignment & End Sem Exam
16	Tutorial 4	Tutorial	2,3	Mid Term-1, Quiz/Assignment & End Sem Exam
17	Basic drug information resources	Lecture	4	Mid Term-1, Quiz/Assignment & End Sem Exam
18	Specialised resources for ADRs	Lecture	3	Mid Term-1, Quiz/Assignment & End Sem Exam
19	Establishing in a hospital, Establishment & operation of drug safety department in industry	Lecture	2,3	Mid Term-1, Quiz/Assignment & End Sem Exam
20	Tutorial 5	Tutorial	3	Mid Term-1, Quiz/Assignment & End Sem Exam
21	Contract Research Organisations (CROs)	Lecture	6	Mid Term-1,



				Quiz/Assignment & End Sem Exam
22	Establishing a national programme	Lecture	3	Mid Term-1, Quiz/Assignment & End Sem Exam
23	Vaccine Pharmacovigilance, Vaccination failure, Adverse events following immunization	Lecture	3	Mid Term-1, Quiz/Assignment & End Sem Exam
24	Tutorial 6	Tutorial	3	Mid Term-1, Quiz/Assignment & End Sem Exam
25	Passive surveillance – Spontaneous reports and case series	Lecture	4	Mid Term-1, Quiz/Assignment & End Sem Exam
26	Stimulated reporting	Lecture	3	Mid Term-1, Quiz/Assignment & End Sem Exam
27	Active surveillance – Sentinel sites, drug event monitoring and registries	Lecture	4	Mid Term-1, Quiz/Assignment & End Sem Exam
28	Tutorial 7	Tutorial	4	Mid Term-1, Quiz/Assignment & End Sem Exam
29	Comparative observational studies – Cross sectional study, case control study and cohort study	Lecture	3	Mid Term-1, Quiz/Assignment & End Sem Exam
30	Targeted clinical investigations	Lecture	3	Mid Term-1, Quiz/Assignment & End Sem Exam
31	Effective communication in Pharmacovigilance	Lecture	3	Mid Term-2, Quiz/Assignment & End Sem Exam
32	Tutorial 8	Tutorial	3,6	Mid Term-2, Quiz/Assignment & End Sem Exam
33	Communication in Drug Safety Crisis management	Lecture	3	Mid Term-2, Quiz/Assignment & End Sem Exam
34	Communicating with Regulatory Agencies, Business Partners, Healthcare facilities & Media	Lecture	3	Mid Term-2, Quiz/Assignment & End Sem Exam
35	Pre clinical phase, Clinical phase, Post approval phase (PMS)	Lecture	6	Mid Term-2, Quiz/Assignment & End Sem Exam
36	Tutorial 9	Tutorial	6	Mid Term-2, Quiz/Assignment



				& End Sem Exam
37	ICH Guidelines for Pharmacovigilance	Lecture	3	Mid Term-2, Quiz/Assignment & End Sem Exam
38	Expedited reporting	Lecture	3	Mid Term-2, Quiz/Assignment & End Sem Exam
39	Individual case safety reports	Lecture	3	Mid Term-2, Quiz/Assignment & End Sem Exam
40	Tutorial 10	Tutorial	3,6	Mid Term-2, Quiz/Assignment & End Sem Exam
41	Periodic safety update reports	Lecture	3	Mid Term-2, Quiz/Assignment & End Sem Exam
42	Post approval expedited reporting	Lecture	3	Mid Term-2, Quiz/Assignment & End Sem Exam
43	Pharmacovigilance planning	Lecture	2,3	Mid Term-2, Quiz/Assignment & End Sem Exam
44	Tutorial 11	Tutorial	3,6	Mid Term-2, Quiz/Assignment & End Sem Exam
45	Good clinical practice in pharmacovigilance studies	Lecture	6	Mid Term-2, Quiz/Assignment & End Sem Exam
46	Genetics related ADR with example focusing PK parameters	Lecture	6	Mid Term-2, Quiz/Assignment & End Sem Exam
47	Paediatrics, Pregnancy and lactation, Geriatrics	Lecture	6	Mid Term-2, Quiz/Assignment & End Sem Exam
48	Tutorial 12	Tutorial	6	Mid Term-2, Quiz/Assignment & End Sem Exam
49	Paediatrics, Pregnancy and lactation, Geriatrics	Lecture	6	Mid Term-2, Quiz/Assignment & End Sem Exam
50	Paediatrics, Pregnancy and lactation, Geriatrics	Lecture	6	Mid Term-2, Quiz/Assignment & End Sem Exam
51	CIOMS Working Groups, CIOMS Working Groups	Lecture	3	Mid Term-2, Quiz/Assignment & End Sem Exam





52	Tutorial 13	Tutorial	3,6	Mid Term-2, Quiz/Assignment & End Sem Exam
53	CIOMS Working Groups, CIOMS Working Groups	Lecture	3,6	Mid Term-2, Quiz/Assignment & End Sem Exam
54	CIOMS Working Groups, CIOMS Working Groups	Lecture	3,6	Mid Term-2, Quiz/Assignment & End Sem Exam
55	D&C Act and Schedule Y	Lecture	3	Mid Term-2, Quiz/Assignment & End Sem Exam
56	Tutorial 14	Tutorial	3,6	Mid Term-2, Quiz/Assignment & End Sem Exam
57	D&C Act and Schedule Y	Lecture	3	Mid Term-2, Quiz/Assignment & End Sem Exam
58	Differences in Indian and global pharmacovigilance requirements	Lecture	2	Mid Term-2, Quiz/Assignment & End Sem Exam
59	Differences in Indian and global pharmacovigilance requirements	Lecture	2	Mid Term-2, Quiz/Assignment & End Sem Exam
60	Tutorial 15	Tutorial	2,6	Mid Term-2, Quiz/Assignment & End Sem Exam

### B. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES											CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
<b>BP805E T.1.</b>	<b>BP805ET.1.</b> Detecting ADRS prevention of ADRS and assesment of ADRS	3	1	3	2	1	1	1	1	3	1	3		3	2	-

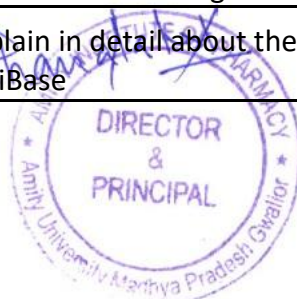


<b>BP805E T.2.</b>	<b>BP805ET.2</b> Understanding the national and international scenario of pharmacovigilance	2	1	3	2	1	1	1	1	2	1	3	-	1	1
<b>BP805E T.3.</b>	<b>BP805ET.3</b> Understand detection and assessment of new adverse drug reactions, Adverse drug reaction reporting systems and communication in pharmacovigilance, PV Program of India (PvPI) requirement for ADR reporting in India ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilance planning. CIOMS requirements for ADR reporting	3	1	2	2	1	1	1	1	3	1	3	3	2	1
<b>BP805E T.4.</b>	<b>BP805ET.4</b> Know the various methods used for reporting ADRs	3	1	3	2	1	1	1	1	2	1	3	2	3	1
<b>BP805E T.5.</b>	<b>BP805ET.5</b> Understand the International standards for classification of diseases and drugs and ATC Classification	2	1	3	2	1	1	1	1	3	1	3	3	2	-
<b>BP805E T.6.</b>	<b>BP805ET.6</b> Comprehend methods of safety data during preclinical, clinical and post approval phases of drugs' life cycle	3	1	2	2	1	1	1	1	3	1	3	2	2	1



## Sample Question Paper

Amity Institute of Pharmacy <b>Department of Pharmacology</b> I MID-SEMESTER (SEM –VIIIth) 2023-24						
Class: B.Pharm, VIII Semester						
Subject Name: BP805ET Pharmacovigilance Theory		Time: 1 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,3,4,5,9	Q.6,7,8		Q.2		
The student will be able to <b>CO.1.</b> Detecting ADRS prevention of ADRS and assesment of ADRS <b>CO.2</b> Understanding the national and international scenario of pharmacovigilance <b>CO.3</b> Understand detection and assesment of new adverse drug reactions, Adverse drug reaction reporting systems and communication in pharmacovigilance, PV Program of India (PvPI) requirement for ADR reporting in India ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilance planning. CIOMS requirements for ADR reporting <b>CO.4</b> Know the various methods used for reporting ADRs <b>CO.5</b> Understand the International standards for classification of diseases and drugs <b>CO.6</b> Comprehend methods of safety data during preclinical, clinical and post approval phases of drugs' life cycle						
CO Map	Question No.	Question				Marks
CO2	Q.1	Write about the yellow card system in pharmacovigilance				2
CO1	Q.2	What are Dechallenge and Rechallenge in causality assessment?				2
CO1	Q.3	What is Defined Daily Dose?				2
CO5	Q.4	Enlist any two differences between brand name and nonproprietary names.				2
CO3	Q.5	State the importance of vaccine safety surveillance				2
CO5	Q.6	Write the Objectives of Pharmacovigilance and ATC classification of drugs				10
CO3	Q.7	Explain in detail about the WHO PIDM, UMC and VigiBase				10



CO1	Q.8	Explain the Hartwig's Severity Assessment Scale for ADR	5
CO6	Q.9	Write details about the adverse drug reaction reporting form	5
CO2	Q.10	Explain in detail about the Contract Research Organizations	5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

**Attainment Level:**

76.19 % Percentage of students secured more than 60% marks, so this course Pharmacovigilance – Theory (BP805ET) and attained Level 2.





# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICS

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24

**PEO 1:** To provide basic and core knowledge and application in the field of pharmaceutical technology and abilities in organizational and management skills with a strong focus on analysis and problem-solving potential.

**PEO 2:** To identify and nurture the leadership qualities to facilitate improvement in the healthcare sector with a distinct professional identity and strong technical competence.

**PEO 3:** To inculcate ethical and moral values among the students to serve efficiently and contribute positively to society through effective and clear communication.

**PEO 4:** To understand and apply the strategies of pharmacy practice to support environmental sustainability and prepare the students as a lifelong learner to deliver pharmaceutical care in the ever-changing world.

### Programme Outcomes:

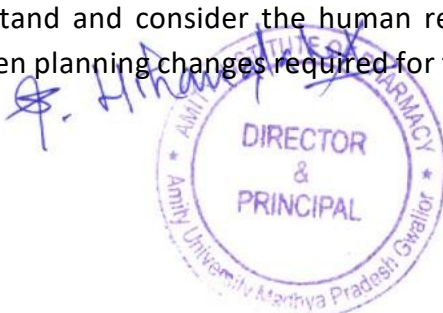
**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and



societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

#### **Programme Specific Outcomes (PSOs):**

**PSO1:** Pharmacy graduates will be familiar with the basics of developing both traditional and innovative pharmaceutical dosage forms, as well as the most recent developments in the field of pharmaceutical product development.

**PSO 2:** The graduates will be able to plan, design, and understand a variety of analytical studies and reports that the pharmaceutical industry uses for drug development, formulation design, production, and other related processes.

**PSO 3:** The graduates will be able to understand the pharmaceutical ethics related to the pharmacy profession by learning about the various laws and regulations that regulate various elements of the pharmacy field.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “- “



**PROGRAMME ARTICULATION MATRIX**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
VIII SEM	BP809ET	3	-	3	2	2	3	2	2	3	2	1	1	2	-

*[Handwritten Signature]*



DIRECTOR  
&  
PRINCIPAL



## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

### Course Handout

#### Course: COSMETIC SCIENCE THEORY

Course Code : BP809ET, Crédits : 04, Session :2023-24 (Odd Sem.), Class : B.Pharm. 4th Year

Faculty Name: Dr. Jovita Kanoujia

**A. Introduction:** This course is designed to impart basic knowledge on important legislations related to the profession of pharmacy

**B. Course Outcomes:** At the end of the course, students will be able to:

**BP809ET.1:** Classify and define Cosmetics and Cosmeceuticals as per Indian and EU regulations

**BP809ET.2:** Describe the role of cosmetic excipients and building blocks in the formulation of cosmetics

**BP809ET.3:** Explain the structure and function of the skin, hair, teeth and gums

**BP809ET.4:** Describe the fundamentals of sun protection and the formulation of Sunscreens, antiperspirants and deodorants

**BP809ET.5:** Formulate cosmetics for skin care and hair care as well as dental and oral care

**BP809ET.6:** Design herbal cosmetics for skin care, hair care and oral care

**BP809ET.7:** Evaluate cosmetics for various physico-chemical properties.

**BP809ET.8:** Design cosmetics and cosmeceuticals that address the problems of dry skin, acne, dermatitis, prickly heat, wrinkles, blemishes, hair fall, Dandruff, body odour, bleeding gums, mouth odour, teeth discoloration and sensitive teeth.

**C. Programme Outcomes:**

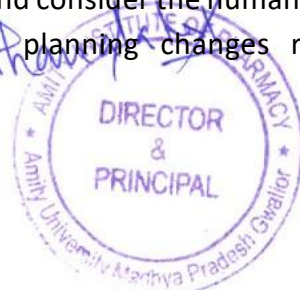
**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice,





professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**D. Programme Specific Outcomes:**

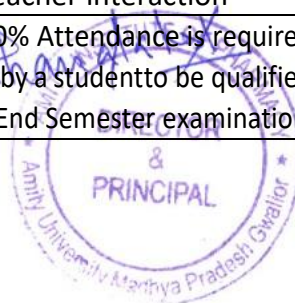
**PSO 1:** Will be able to design, develop and implement efficient software for a given real life problem.

**PSO 2:** Will be able to apply knowledge of AI, Machine Learning and Data Mining in analyzing big data forextracting useful information from it and for performing predictive analysis.

**PSO 3:** Will be able to design, manage and secure wired/ wireless computer networks for transfer and sharing of information.

**E. Assessment Plan:**

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	3%
	Student – Teacher interaction	S-T I	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination.	A	4%



	The allowance of 20% includes all types of leaves including medical leaves.		
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

## F. Syllabus

### UNIT I

Classification of cosmetic and cosmeceutical products Definition of cosmetics as per Indian and EU regulations, Evolution of cosmeceuticals from cosmetics, cosmetics as quasi and OTC drugs Cosmetic excipients: Surfactants, rheology modifiers, humectants, emollients, preservatives. Classification and application Skin: Basic structure and function of skin. Hair: Basic structure of hair. Hair growth cycle. Oral Cavity: Common problem associated with teeth and gums.

### UNIT II

Principles of formulation and building blocks of skin care products: Face wash, Moisturizing cream, Cold Cream, Vanishing cream and their advantages and disadvantages. Application of these products in formulation of cosmeceuticals. Antiperspirants & deodorants- Actives & mechanism of action. Principles of formulation and building blocks of Hair care products: Conditioning shampoo, Hair conditioner, anti-dandruff shampoo. Hair oils. Chemistry and formulation of Para-phenylene diamine based hair dye. Principles of formulation and building blocks of oral care products: Toothpaste for bleeding gums, sensitive teeth. Teeth whitening, Mouthwash.

### UNIT III

Sun protection, Classification of Sunscreens and SPF. Role of herbs in cosmetics: Skin Care: Aloe and turmeric Hair care: Henna and amla. Oral care: Neem and clove Analytical cosmetics: BIS specification and analytical methods for shampoo, skin- cream and toothpaste.

### UNIT IV

Principles of Cosmetic Evaluation: Principles of sebumeter, corneometer. Measurement of TEWL, Skin Color, Hair tensile strength, Hair combing properties Soaps, and syndet bars. Evolution and skin benefits.

### UNIT V

Oily and dry skin, causes leading to dry skin, skin moisturisation. Basic understanding of the terms Comedogenic, dermatitis. Cosmetic problems associated with Hair and scalp: Dandruff, Hair fall causes Cosmetic problems associated with skin: blemishes, wrinkles, acne, prickly heat and body odor. Antiperspirants and Deodorants- Actives and mechanism of action

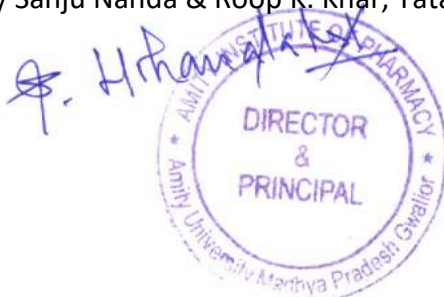
## G. Examination Scheme:

Components	A	CT	S/V/Q/HA	STI	EE
Weightage (%)	4	15	3	3	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination; A: Attendance

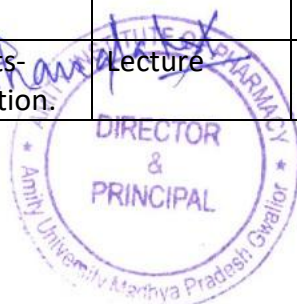
## H. Suggested Text/Reference Books:

- 1) Harry's Cosmeticology, Wilkinson, Moore, Seventh Edition, George Godwin.
- 2) Cosmetics – Formulations, Manufacturing and Quality Control, P.P. Sharma, 4 th Edition, Vandana Publications Pvt. Ltd., Delhi.
- 3) Text book of cosmeticology by Sanju Nanda & Roop K. Khar, Tata Publishers.



## I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Classification of cosmetic and cosmeceutical products	Lecture	1	Mid Term-1, Quiz & End Sem Exam
2	Definition of cosmetics as per Indian and EU regulations,	Lecture	1	Mid Term-1, Quiz & End Sem Exam
3	Evolution of cosmeceuticals from cosmetics, cosmetics as quasi and OTC drugs.	Lecture	1	Mid Term-1, Quiz & End Sem Exam
4	Discussion on general cosmetics and their regulations	Tutorial	1	Mid Term-1, Quiz & End Sem Exam
5	Cosmetic excipients: Surfactants, rheology modifiers,	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
6	humectants, emollients	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
7	preservatives.	Lecture	1,2	Mid Term-1, Quiz & End Sem Exam
8	Doubt clearing session	Tutorial	1,2	Mid Term-1, Quiz & End Sem Exam
9	Hair: Basic structure of hair.	Lecture	3	Mid Term-1, Quiz & End Sem Exam
10	Hair growth cycle.	Lecture	3	Mid Term-1, Quiz & End Sem Exam
11	Oral Cavity: Common problem associated with teeth and gums.	Lecture	3	Mid Term-1, Quiz & End Sem Exam
12	Revision of all cosmetic excipients	Tutorial	3	Mid Term-1, Quiz & End Sem Exam
13	Oral Cavity: Common problem associated with teeth and gums.	Lecture	1	Mid Term-1, Quiz & End Sem Exam
14	<b>Principles of formulation and building blocks of skin care products:</b> Face wash, Moisturizing cream,	Lecture	2,5,	Mid Term-1, Quiz & End Sem Exam
15	Cold Cream, Vanishing cream and their advantages and disadvantages.	Lecture	2,5,	Mid Term-1, Quiz & End Sem Exam
16	Class test	Tutorial	1,2,3,5	Mid Term-1, Quiz & End Sem Exam
17	Application of these products in formulation of cosmeceuticals.	Lecture	2,5,	Mid Term-1, Quiz & End Sem Exam
18	Antiperspirants & deodorants- Actives & mechanism of action.	Lecture	2,5,8	Mid Term-1, Quiz & End Sem Exam



19	Principles of formulation and building blocks of Hair care products: Conditioning shampoo, Hair conditioner	Lecture	3,5,8	Mid Term-1, Quiz & End Sem Exam
20	Group discussion on formulations of skin and hair	Tutorial	3,5,8	Mid Term-1, Quiz & End Sem Exam
21	anti-dandruff shampoo. Hair oils.	Lecture	3,5,8	Mid Term-1, Quiz & End Sem Exam
22	Chemistry and formulation of Para-phylyene diamine based hair dye.	Lecture	3,5,8	Mid Term-1, Quiz & End Sem Exam
23	Principles of formulation and building blocks of oral care products: Toothpaste for bleeding gums,	Lecture	3, 6,8	Mid Term-1, Quiz & End Sem Exam
24	Quiz	Tutorial	3, 6,8	Mid Term-1, Quiz & End Sem Exam
25	Toothpaste for sensitive teeth.	Lecture	8	Mid Term-1, Quiz & End Sem Exam
26	Teeth whitening, Mouthwash	Lecture	8	Mid Term-1, Quiz & End Sem Exam
27	Sun protection,	Lecture	4,	Mid Term-1, Quiz & End Sem Exam
28	Revision	Tutorial	3,6,8,4	Mid Term-1, Quiz & End Sem Exam
29	Classification of Sunscreens	Lecture	2,4,5	Mid Term-1, Quiz & End Sem Exam
30	Classification of SPF	Lecture	2,4,5	Mid Term-1, Quiz & End Sem Exam
31	Role of herbs in cosmetics	Lecture	2,6	Mid Term-2, Quiz & End Sem Exam
32	Seminar	Tutorial	4,5	Mid Term-2, Quiz & End Sem Exam
33	Skin Care: Aloe and turmeric	Lecture	2,6	Mid Term-2, Quiz & End Sem Exam
34	Hair care: Henna and amla.	Lecture	2,6	Mid Term-2, Quiz & End Sem Exam
35	Oral care: Neem and clove	Lecture	2,6,5	Mid Term-2, Quiz & End Sem Exam
36	Group discussion on various types of herbals used in cosmetics	Tutorial	4,5,6	Mid Term-2, Quiz & End Sem Exam
37	Analytical cosmetics: BIS specification	Lecture	7	Mid Term-2, Quiz & End Sem Exam
38	analytical methods for shampoo	Lecture	5,7,8	Mid Term-2, Quiz & End Sem Exam
39	skin- cream and toothpaste.	Lecture	3,5	Mid Term-2, Quiz & End Sem Exam
40	Seminar	Tutorial	5,6,7,8	Mid Term-2, Quiz & End Sem Exam

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41	General introduction to Principles of Cosmetic Evaluation	Lecture	7	Mid Term-2, Quiz & End Sem Exam
42	Principles of sebumeter	Lecture	7,8	Mid Term-2, Quiz & End Sem Exam
43	Principles of corneometer	Lecture	7,8	Mid Term-2, Quiz & End Sem Exam
44	Revision class	Tutorial	7,8	Mid Term-2, Quiz & End Sem Exam
45	Measurement of TEWL	Lecture	7,8	Mid Term-2, Quiz & End Sem Exam
46	Skin Color, Hair tensile strength,	Lecture	3,8	Mid Term-2, Quiz & End Sem Exam
47	Hair combing properties	Lecture	3,8	Quiz & End Sem Exam
48	Doubt clearing session	Tutorial	7,8	Quiz & End Sem Exam
49	Soaps and syndet bars.	Lecture	8	Quiz & End Sem Exam
50	Evolution and skin benefits.	Lecture	3,8	Quiz & End Sem Exam
51	Oily and dry skin, causes leading to dry skin, skin moisturisation.	Lecture	3,8	Quiz & End Sem Exam
52	Quiz	Tutorial	8	Quiz & End Sem Exam
53	Basic understanding of the terms Comedogenic, dermatitis	Lecture	3,8	Quiz & End Sem Exam
54	Cosmetic problems associated with Hair and scalp: Dandruff, Hair fall causes	Lecture	3,6,8	Quiz & End Sem Exam
55	Cosmetic problems associated with skin: blemishes, wrinkles	Lecture	3,6,8	Quiz & End Sem Exam
56	General Discussion on skin and hair problems and their solutions	Tutorial	3,6,8	Quiz & End Sem Exam
57	acne, prickly heat and body odor	Lecture	3,6,8	Quiz & End Sem Exam
58	Antiperspirants and Deodorants-Actives and	Lecture	3,6,8	Quiz & End Sem Exam
59	mechanism of action	Lecture	3,6,8	Quiz & End Sem Exam
60	Class test	Tutorial	1,2,3,4,5,6	Quiz & End Sem Exam

*S. H. H. H.*

AMITY UNIVERSITY PHARMACY  
 DIRECTOR & PRINCIPAL  
 Amity University, Mathya Pradesh, Gwalior

### J. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES											CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
<b>BP80 9ET.1</b>	Classify and define Cosmetics and Cosmeceuticals as per Indian and EU regulations	3	-	3	-	-	1	3	3	3	2	1		1	-	-
<b>BP80 9ET.2.</b>	Describe the role of cosmetic excipients and building blocks in the formulation of cosmetics	3	-	2	-	1	2	-	1	-	1	1		1	-	-
<b>BP80 9ET.3.</b>	Explain the structure and function of the skin, hair, teeth and gums	3	-	2	-	-	3	-	1	-	-	-		-	-	-
<b>BP80 9ET.4.</b>	Describe the fundamentals of sun protection and the formulation of Sunscreens, antiperspirants and deodorants	3	-	3	-	-	3	-	1	-	-	1		1	1	-
<b>BP80 9ET.5.</b>	Formulate cosmetics for skin care and hair care as well as dental and oral care	3	-	3	-	-	3	-	-	1	-	3		2	1	-
<b>BP80 9ET.6.</b>	Design herbal cosmetics for skin care, hair care and oral care	3	-	3	-	1	3	-	-	1	3	3		1	1	-
<b>BP80 9ET.7</b>	Evaluate cosmetics for various physico-chemical properties.	3	-	3	1	3	3	1	1	-	-	3		1	2	-
<b>BP80 9ET.8</b>	Design cosmetics and cosmeceuticals that address the problems of dry skin, acne, dermatitis, prickly heat,	3	-	3	2	2	3	-	3	-	-	3		2	2	-



wrinkles, blemishes, hair fall, Dandruff, body odour, bleeding gums, mouth odour, teeth discoloration and sensitive teeth.																				
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**Sample Question Paper**

Amity Institute of Pharmacy Department of Pharmaceutics I MID-SEMESTER (SEM –VIII th) 2023-24						
Class: B.Pharm, VIII th Semester						
Subject Name: BP809ET. COSMETIC SCIENCE THEORY		Time: 1 Hr			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1, 2, 7,9, 10	Q.3,6	Q. 5	Q. 4,8		
Student will be able to CO1: List the broad perceptive of cloud architecture and model. CO2: Apply different cloud programming models as per need.						
CO Map	Question No.	Question				Marks
CO1	Q.1	<b>Define</b> the terms cosmeceuticals and comedogenic.				2
CO1	Q.2	<b>Name</b> some marketed cosmeceuticals.				2
CO1	Q.3	<b>Classify</b> different surfactants used in cosmetic.				2
CO2	Q.4	<b>Distinguish</b> between moisturizing and vanishing cream.				2
CO1	Q.5	<b>Identify</b> the reasons behind sensitive teeth.				2
CO3	Q.6	<b>Explain</b> with proper diagram basic structure & function of hair.				10
CO4	Q.7	<b>Outline</b> the Chemistry and formulation of hair conditioner.				10
CO3	Q.8	<b>Compare</b> the formulation of aloe and heena as a herbs used				5



CO3	Q.9	<b>List</b> the Common problem associated with skin.	5
CO1	Q.10	<b>What</b> are Indian regulation regulations for cosmetics?	5

Attainments		Rubric
<b>Level</b>	1	IF 60% of students secure more than 60% marks then level 1
<b>Level</b>	2	IF 70% of students secure more than 60% marks then level 2
<b>Level</b>	3	IF 80% of students secure more than 60% marks then level 3

**Attainment Level 3:**

68.8 % of students secured more than 60% marks, so this course Cosmetic Science (BP809ET) attainment is level 1.

*H. H. H. H.*





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# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY INSTITUTE OF PHARMACY

DEPARTMENT OF PHARMACEUTICS

## PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

**Bachelor of Pharmacy (B. Pharm.), Academic Year – 2023-24**

### **Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

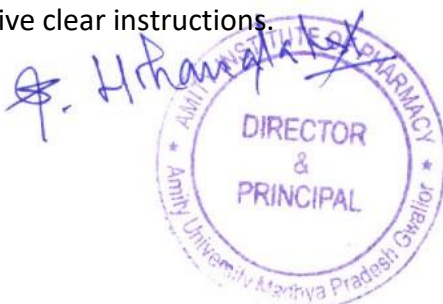
**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

**[PO.6]. Professional Identity:** Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

**[PO.7]. Pharmaceutical Ethics:** Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

**[PO.8]. Communication:** Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.



**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

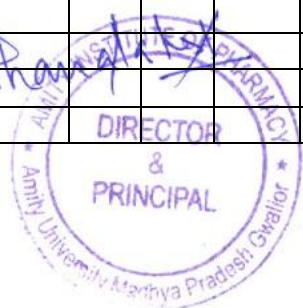
**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**Note:** - Correlation levels 1, 2 and 3 as defined below:

1: Slight (Low), 2: Moderate (Medium) and 3 : Substantial (High)

If there is no correlation, put “- “

PROGRAMME ARTICULATION MATRIX																	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
I SEM																	



II SEM																		
III SEM																		
IV SEM	-																	
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VII SEM	-																	
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VIII SEM	-																	
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	-																	
	-																	
	Elective-Pharmaceutical Product Development	3	3	3	3	1	1	2	2	1	1	3						

  
  
 DIRECTOR & PRINCIPAL



# AMITY UNIVERSITY

MADHYA PRADESH

Established vide Government of Madhya Pradesh Act No. 27 of 2010

<b>DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING</b>
<b>Course Handout</b>
Course : Pharmaceutical Product Development (Elective)
Course Code : BP 813ET, Crédits : 04, Session :2023-24 (Even Sem.), Class : B.Pharm. 4th Year
Faculty Name: Tanweer Haider

**A. Introduction:** This course deals with the various aspects of quality control and quality assurance aspects of pharmaceutical industries. It deals with the important aspects like cGMP, QC tests, documentation, quality certifications and regulatory affairs..

**B. Course Outcomes:** At the end of the course, students will be able to:

**CO1.** Provide the enhanced product and process understanding and regulation in product development.

**CO2.** Achieve the goal of large-scale product with reproducible quality product.

**CO3.** Understand the advancement in pharmaceutical manufacturing and analytical techniques.

**CO4.** Understand design, development, optimization and stability of pharmaceutical products.

**CO5.** Provide the enhanced knowledge of excipients.

**C. Programme Outcomes:**

**[PO.1]. Pharmacy Knowledge:** Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

**[PO.2]. Planning Abilities:** Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

**[PO.3]. Problem analysis:** Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.



**[PO.4]. Modern tool usage:** Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

**[PO.5]. Leadership skills:** Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.

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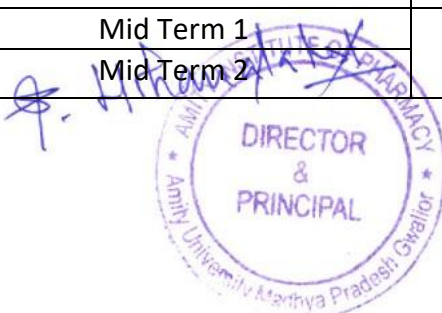
**[PO.9]. The Pharmacist and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

**[PO.10]. Environment and sustainability:** Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**[PO.11]. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

**D. Assessment Plan:**

<b>Component of Evaluation</b>	<b>Description</b>	<b>Code</b>	<b>Weightage %</b>
Continuous Internal	Mid Term 1	CT	15%
	Mid Term 2		



Evaluation	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	3%
	Student – Teacher interaction	S-T I	3%
Attendance	A minimum of 80% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 20% includes all types of leaves including medical leaves.	A	4%
End Semester Examination	End Semester Examination	EE	75%
<b>Total</b>			<b>100%</b>

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\* AMITY INSTITUTE OF PHARMACY \*  
DIRECTOR & PRINCIPAL  
Amity University, Madhya Pradesh, Gwalior

## E. Syllabus

### UNIT – I

Introduction to pharmaceutical product development, objectives, regulations related to preformulation, formulation development, stability assessment, manufacturing and quality control testing of different types of dosage forms.

### UNIT - II

An advanced study of Pharmaceutical Excipients in pharmaceutical product development with a special reference to the following categories

- i. Solvents and solubilizers
- ii. Cyclodextrins and their applications
- iii. Non-ionic surfactants and their applications
- iv. Polyethylene glycols and sorbitols
- v. Suspending and emulsifying agents
- vi. Semi solid excipients.

### UNIT – III

An advanced study of Pharmaceutical Excipients in pharmaceutical product development with a special reference to the following categories

- i. Tablet and capsule excipients
- ii. Directly compressible vehicles
- iii. Coat materials
- iv. Excipients in parenteral and aerosols products
- v. Excipients for formulation of NDDS

Selection and application of excipients in pharmaceutical formulations with specific industrial applications.

### UNIT – IV

Optimization techniques in pharmaceutical product development. A study of various optimization techniques for pharmaceutical product development with specific examples. Optimization by factorial designs and their applications. A study of QbD and its application in pharmaceutical product development.

### UNIT – V

Selection and quality control testing of packaging materials for pharmaceutical product development- regulatory considerations.

## F. Examination Scheme:

Components	A	CT	S/V/Q/HA	STI	EE
Weightage (%)	4	15	3	3	75

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, STI: Student-Teacher Interaction, EE: End Semester Examination; A: Attendance

## G. Suggested Text/Reference Books:

1. HA Pawar and KG Lalitha. Pharmaceutical Product Development: A systematic Approach. Lambert Publication.
2. Vandana B. Patravale. Pharmaceutical Product Development: Insights into Pharmaceutical Processes, Management and Regulatory Affairs. CRC Press.

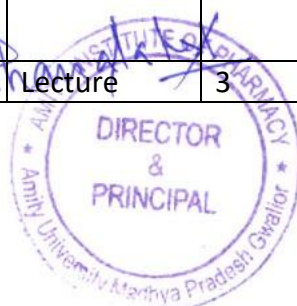




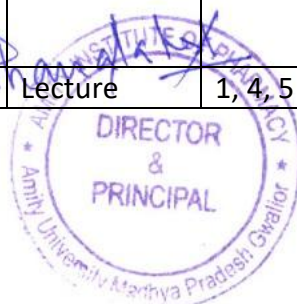
3. Published Research and Review articles.

**H. Lecture Plan**

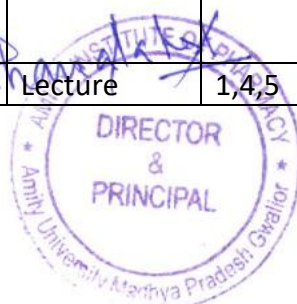
Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction to pharmaceutical product development, objectives,	Lecture	1, 2,3	Mid Term-1, Quiz & End Sem Exam
2	Regulations related to preformulation	Lecture	1	Mid Term-1, Quiz & End Sem Exam
3	Formulation development	Lecture	1,2,3,4	Mid Term-1, Quiz & End Sem Exam
4	Formulation development	Lecture	1,2,3,4	Mid Term-1, Quiz & End Sem Exam
5	Stability assessment	Lecture	4	Mid Term-1, Quiz & End Sem Exam
6	Stability assessment	Lecture	4	Mid Term-1, Quiz & End Sem Exam
7	Manufacturing and quality control testing of different types of dosage forms	Lecture	3	Mid Term-1, Quiz & End Sem Exam
8	Manufacturing and quality control testing of different types of dosage forms	Lecture	3	Mid Term-1, Quiz & End Sem Exam
9	Manufacturing and	Lecture	3	Mid



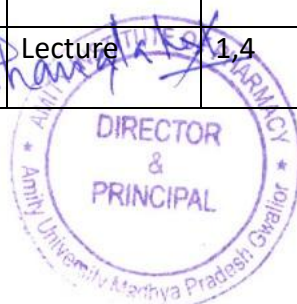
	quality control testing of different types of dosage forms			Term-1, Quiz & End Sem Exam
10	Manufacturing and quality control testing of different types of dosage forms	Lecture	3	Mid Term-1, Quiz & End Sem Exam
11	Quiz	Tutorial		Quiz & End Sem
12	An advanced study of Pharmaceutical Excipients in pharmaceutical product development with a special reference to the following categories: Solvents and solubilizers	Lecture	1, 4, 5	Mid Term-1, Quiz & End Sem Exam
13	Solvents and solubilizers	Lecture	1, 3	Mid Term-1, Quiz & End Sem Exam
14	Cyclodextrins and their applications	Lecture	1, 5	Mid Term-1, Quiz & End Sem Exam
15	Non-ionic surfactants and their applications	Lecture	1, 4, 5	Mid Term-1, Quiz & End Sem Exam
16	Polyethylene glycols and sorbitols	Lecture	1, 4, 5	Mid Term-1, Quiz & End Sem Exam
17	Suspending and emulsifying agents	Lecture	1, 4, 5	Mid Term-1, Quiz & End Sem Exam
18	Suspending and	Lecture	1, 4, 5	Mid



	emulsifying agents			Term-1, Quiz & End Sem Exam
19	Semi solid excipients	Lecture	1,4, 5	Mid Term-1, Quiz & End Sem Exam
20	Semi solid excipients	Lecture	1,4,5	Mid Term-1, Quiz & End Sem Exam
21	Semi solid excipients	Lecture	1,4,5	Mid Term-1, Quiz & End Sem Exam
22	Unit test	Tutorial		Mid Term-1, Quiz & End Sem Exam
23	An advanced study of Pharmaceutical Excipients in pharmaceutical product development with a special reference to the following categories: Tablet and capsule excipients	Lecture	4,5	Mid Term-1, Quiz & End Sem Exam
24	Tablet and capsule excipients	Lecture	1,4,5	Mid Term-1, Quiz & End Sem Exam
25	Directly compressible vehicles	Tutorial	1,4,5	Mid Term-1, Quiz & End Sem Exam
26	Coat materials	Lecture	1,4,5	Mid



				Term-1, Quiz & End Sem Exam
27	Coat materials	Lecture	1,4,5	Mid Term-1, Quiz & End Sem Exam
28	Excipients in parenteral and aerosols products	Lecture	1, 4, 5	Mid Term-2, Quiz & End Sem Exam
29	Excipients in parenteral and aerosols products	Lecture	1, 4, 5	Mid Term-2, Quiz & End Sem Exam
30	Excipients for formulation of NDDS	Lecture	1, 4, 5	Mid Term-2, Quiz & End Sem Exam
31	Excipients for formulation of NDDS	Lecture	1, 4, 5	Mid Term-2, Quiz & End Sem Exam
32	Excipients for formulation of NDDS Selection and application of excipients in pharmaceutical formulations with specific industrial applications.	Lecture	1, 4, 5	Mid Term-2, Quiz & End Sem Exam
33	Optimization techniques in pharmaceutical product development.	Lecture	1,4	Mid Term-2, Quiz & End Sem Exam
34	Optimization techniques in	Lecture	1,4	Mid Term-2,



	pharmaceutical product development.			Quiz & End Sem Exam
35	A study of various optimization techniques for pharmaceutical product development with specific examples.	Lecture	1,4	Mid Term-2, Quiz & End Sem Exam
36	A study of various optimization techniques for pharmaceutical product development with specific examples.	Lecture	1,4	Mid Term-2 Quiz & End Sem Exam
37	Optimization by factorial designs and their applications.	Lecture	4	Mid Term-2, Quiz & End Sem Exam
38	Optimization by factorial designs and their applications.	Lecture	4	Mid Term-2, Quiz & End Sem Exam
39	A study of QbD and its application in pharmaceutical product development.	Lecture	4	Mid Term-2, Quiz & End Sem Exam
40	A study of QbD and its application in pharmaceutical product development.	Lecture	4	Mid Term-2, Quiz & End Sem Exam
41	Selection and quality control testing of packaging materials for pharmaceutical product development-regulatory considerations.	Lecture	1,5	Mid Term-2, Quiz & End Sem Exam



42	Selection and quality control testing of packaging materials for pharmaceutical product development-regulatory considerations.	Lecture	1,5	Mid Term-2, Quiz & End Sem Exam
43	Selection and quality control testing of packaging materials for pharmaceutical product development-regulatory considerations.	Lecture	1,5	Mid Term-2, Quiz & End Sem Exam
44	Selection and quality control testing of packaging materials for pharmaceutical product development-regulatory considerations.	Lecture	1,5	Mid Term-2, Quiz & End Sem Exam
45	Selection and quality control testing of packaging materials for pharmaceutical product development-regulatory considerations.	Lecture	1,5	Mid Term-2, Quiz & End Sem Exam
46	Selection and quality control testing of packaging materials for pharmaceutical product development-regulatory considerations.	Lecture	1,5	Mid Term-2, Quiz & End Sem Exam
47	Selection and quality control testing of packaging materials for pharmaceutical product development-regulatory considerations.	Lecture	1,5	Mid Term-2, Quiz & End Sem Exam



48	Quiz	Tutorial		Quiz & End Sem Exam
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### I. Course Articulation Matrix (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES											CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	P S O 1	P S O 2	P S O 3
<b>CO1.</b>	<b>CO1.</b> Provide the enhanced product and process understanding and regulation in product development.	3	3	3	3	1	3	2	3	1	3	3				
<b>CO2.</b>	<b>CO2.</b> Achieve the goal of large-scale product with reproducible quality product.	3	3	3	3	2	3	2	3	3	3	3				
<b>CO3.</b>	<b>CO3.</b> Understand the advancement in pharmaceutical manufacturing and analytical techniques.	3	3	3	3	1	3	2	2	2	1	3				
<b>CO4.</b>	<b>CO4.</b> Understand design, development, optimization and stability of pharmaceutical products.	3	3	3	3	2	2	2	3	1	3	3				



CO5.	CO5. Provide the enhanced knowledge of excipients.	3	2	3	2	1	2	2	1	1	2	3				
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### Sample Question Paper

Amity Institute of Pharmacy Department of Pharmaceutics I MID-SEMESTER (SEM –8 <sup>th</sup> ) 2022-23						
Class: B.Pharm, 8 <sup>th</sup> Semester						
Subject Name: Pharmaceutical Product Development		Time: 1 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,2,3,4,7	Q. 2,3, 5,8,9	Q.7,8,10	Q.5,6,9		
<p><b>CO1.</b> Provide the enhanced product and process understanding and regulation in product development.</p> <p><b>CO2.</b> Achieve the goal of large-scale product with reproducible quality product.</p> <p><b>CO3.</b> Understand the advancement in pharmaceutical manufacturing and analytical techniques.</p> <p><b>CO4.</b> Understand design, development, optimization and stability of pharmaceutical products.</p> <p><b>CO5.</b> Provide the enhanced knowledge of excipients.</p>						
CO Map	Question No.	Question				Marks
CO1,2	Q.1	Write importance of of Pharmaceutical Product development				2
CO3	Q.2	Write in-process quality control of tablets.				2
CO1,2,3	Q.3	Write the objectives of preformulation study.				2
CO5	Q.4	Discuss the solubilizing agent with examples.				2
CO3,5	Q.5	Write the importance of PEG enhance the solubility of drugs.				2
CO1	Q.6	Discuss the full factorial and fractional factorial design with suitable examples.				10





CO1,4	Q.7	Write about the regulations related to preformulation study in product development.	10
CO3	Q.8	Discuss the advancement in the parenteral dosages form excipients.	5
CO1,2	Q.9	Discuss in brief the quality control of semisolid dosage.	5
CO5	Q.10	Write the stability assessment of capsules.	5

Attainments		Rubric
Level	1	IF 60% of students secure more than 60% marks then level 1
Level	2	IF 70% of students secure more than 60% marks then level 2
Level	3	IF 80% of students secure more than 60% marks then level 3

### Attainment Level: 2

70 % Percentage of students secured more than 60% marks, so this course Pharmaceutical Product Development (BP813ET) attained Level 2.

