AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

Course Handout
Course : Electronic Devices
Course Code : ECE 301, Crédits : 03, Session :2023-24 (Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Ajay Kumar Dadoria

A. Introduction: The objective of the course is to provide a brief knowledge of Electronic devices to all the students. This course builds from basic knowledge of Semiconductor Physics to an understanding of basic devices and their models. This course builds a foundation for courses on VLSI design and analog CMOS IC Design.

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

ECE 301.1. Understand the principles of semiconductor Physics.

ECE 301.2. Understand and utilize the mathematical models of semiconductor junctions and MOS transistors for circuits and systems.

ECE 301.3. To understand and analyze basic electronic device circuits.

ECE 301.4. To study the applications of electrical devices and practical aspects.

ECE 301.5. To introduce the fabrication process of IC's.

C. Programme Outcomes:

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess

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societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **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

D. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to apply the knowledge to understand, analyze and develop complex Engineering solutions in the field of Electronic Devices, Electronics Networks, Analog and Digital circuits, and Telecommunication Communication networks.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in hardware and software project development using necessary hardware skills and open-ended programming environments to deliver a quality product in multidisciplinary domain.

PSO3. Successful career and Entrepreneurship: An ability to employ modern technology and software platforms in creating innovative career paths in Industry, as an Entrepreneur and a zest for higher studies.

PSO4.Research and Development: An ability to undertake research for the development of new ideas, technology and Engineering solutions for societal benefit.

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	10%

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Attendance	A minimum of 75% Attendance is required to be maintained by a studentto 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%
Total			**100%**

F. Syllabus

Module 1: Introduction to Semiconductor Physics:

Review of Quantum Mechanics, Electrons in periodic Lattices, E-k diagrams. Energy bands in intrinsic and extrinsic silicon; Carrier transport: diffusion current, drift current, mobility and resistivity; sheet resistance, design of resistors

Module II: Generation and recombination of carriers:

Poisson and continuity equation P-N junction characteristics, I-V characteristics, and small signal switching models; Avalanche breakdown, Zener diode, Schottky diode.

Module III: Applications of diode:

Half wave, full wave rectifiers, Bridge rectifier, clipping and clamping circuits.

Module IV: Bipolar Junction Transistor:

Bipolar Junction Transistor, I-V characteristics, Ebers-Moll Model, MOS capacitor, C-V characteristics, MOSFET, I-V characteristics, and small signal models of MOS transistor, LED, photodiode and solar cell.

Module V: Integrated circuit Fabrication Process:

Oxidation, diffusion, ion implantation, photolithography, etching, chemical vapor deposition, sputtering, twin-tub CMOS process.

G. 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

Text & References:

- Robert F. Pierret: Semiconductor Device Fundamentals, Pearson Education.
- Millman and Halkias: Electronic Devices and circuits, Tata McGraw.
- Boylestad: Electronic Devices and Circuits, Pearson Education.
- G. Streetman, and S. K. Banerjee, “Solid State Electronic Devices,” 7th edition, Pearson, 2014.
- D. Neamen , D. Biswas "Semiconductor Physics and Devices," McGraw-Hill Education
- S. M. Sze and K. N. Kwok, “Physics of Semiconductor Devices,” 3rd edition, John Wiley &Sons, 2006.

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- C.T. Sah, “Fundamentals of solid state electronics,” World Scientific Publishing Co. Inc, 1991.
- Y. Tsividis and M. Colin, “Operation and Modeling of the MOS Transistor,” Oxford Univ.Press, 2011.

H. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Review of Quantum Mechanics, Electrons in periodic Lattices.	Lecture	ECE 301.1	Mid Term-1, Quiz & End Sem Exam
2	E-k diagrams. Energy bands in intrinsic and extrinsic silicon.	Lecture	ECE 301.1	Mid Term-1, Quiz & End Sem Exam
3	E-k diagrams. Energy bands in intrinsic and extrinsic silicon.	Lecture	ECE 301.1	Mid Term-1, Quiz & End Sem Exam
4	Carrier transport: diffusion current	Lecture	ECE 301.1	Mid Term-1, Quiz & End Sem Exam
5	Drift current, mobility	Lecture	ECE 301.1	Mid Term-1, Quiz & End Sem Exam
6	Resistivity; sheet resistance, design of resistors	Lecture	ECE 301.1	Mid Term-1, Quiz & End Sem Exam
7	Resistivity; sheet resistance, design of resistors	Lecture	ECE 301.1	Mid Term-1, Quiz & End Sem Exam
8	Poisson and continuity equation P-N junction characteristics	Lecture	ECE 301.2	Mid Term-1, Quiz & End Sem Exam
9	Poisson and continuity equation P-N junction characteristics	Lecture	ECE 301.2	Mid Term-1, Quiz & End Sem Exam
10	I-V characteristics, and small signal switching models	Lecture	ECE 301.2	Mid Term-1, Quiz & End Sem Exam
11	I-V characteristics, and small signal switching models	Lecture	ECE 301.2	Mid Term-1, Quiz & End Sem Exam
12	Avalanche breakdown	Lecture	ECE 301.2	Mid Term-1, Quiz & End Sem Exam
13	Zener diode, Schottky diode	Lecture	ECE 301.2	Mid Term-1, Quiz & End Sem Exam
14	Half wave	Lecture	ECE 301.3	Mid Term-1, Quiz & End Sem Exam

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15	Full wave rectifiers	Lecture	ECE 301.3	Mid Term-1, Quiz & End Sem Exam
16	Full wave rectifiers	Lecture	ECE 301.3	Mid Term-1, Quiz & End Sem Exam
17	Bridge rectifier	Lecture	ECE 301.3	Mid Term-1, Quiz & End Sem Exam
18	Clipping and clamping circuits	Lecture	ECE 301.3	Mid Term-1, Quiz & End Sem Exam
19	Clipping and clamping circuits	Lecture	ECE 301.3	Mid Term-1, Quiz & End Sem Exam
20	Clipping and clamping circuits	Lecture	ECE 301.3	Mid Term-1, Quiz & End Sem Exam
21	Bipolar Junction Transistor, I-V characteristics	Lecture	ECE 301.4	Mid Term-2, Quiz & End Sem Exam
22	Bipolar Junction Transistor, I-V characteristics	Lecture	ECE 301.4	Mid Term-2, Quiz & End Sem Exam
23	Ebers-Moll Model, MOS capacitor	Lecture	ECE 301.4	Mid Term-2, Quiz & End Sem Exam
24	Ebers-Moll Model, MOS capacitor	Lecture	ECE 301.4	Mid Term-2, Quiz & End Sem Exam
25	C-V characteristics, MOSFET, I-V characteristics	Lecture	ECE 301.4	Mid Term-2, Quiz & End Sem Exam
26	C-V characteristics, MOSFET, I-V characteristics	Lecture	ECE 301.4	Mid Term-2, Quiz & End Sem Exam
27	Small signal models of MOS transistor	Lecture	ECE 301.4	Mid Term-2, Quiz & End Sem Exam
28	LED, photodiode and solar cell	Lecture	ECE 301.4	Mid Term-2, Quiz & End Sem Exam
29	Oxidation, diffusion	Lecture	ECE 301.5	Mid Term-2, Quiz & End Sem Exam
30	Ion implantation, photolithography	Lecture	ECE 301.5	Mid Term-2, Quiz & End Sem Exam
31	Ion implantation,	Lecture	ECE 301.5	Mid Term-2,

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	photolithography			Quiz & End Sem Exam
32	Etching, chemical vapor deposition	Lecture	ECE 301.5	Mid Term-2, Quiz & End Sem Exam
33	Etching, chemical vapor deposition	Lecture	ECE 301.5	Mid Term-2, Quiz & End Sem Exam
34	Sputtering, twin-tub CMOS process	Lecture	ECE 301.5	Mid Term-2, Quiz & End Sem Exam
35	Sputtering, twin-tub CMOS process	Lecture	ECE 301.5	Mid Term-2, Quiz & End Sem Exam
36	Sputtering, twin-tub CMOS process	Lecture	ECE 301.5	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			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
ECE301.1	Understand the principles of semiconductor Physics	3	3	1	3	1				2		2	1	1	2	1	
ECE301.2	Understand and utilize the mathematical models of semiconductor junctions and MOS transistors for circuits and systems	3	2	2	2	2				2		1	1	1	2	1	
ECE301.3	To understand and analyze basic electronic	3	2	2	2	2				3		3	1	1	1	1	

	device circuits.																
ECE301.4	To study the applications of electrical devices and practical aspects.	3	2	2	2	2				3		3	1	1	1	1	
ECE301.5	To introduce the fabrication process of IC's.	3	2	2	2	2				3		3	1	1	2	3	

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering I MID-SEMESTER (SEM –III) 2023-24						
Class: B.Tech.(ECE) III Semester						
Subject Name: ECE 301 Electronic Devices		Time: 1.5 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		

Student will be able to
CO1: Understand the principles of semiconductor Physics
CO2: Understand and utilize the mathematical models of semiconductor junctions and MOS transistors for circuits and systems.
CO3: To understand and analyze basic electronic device circuits.
CO4: To study the applications of electrical devices and practical aspects.
CO5: To introduce the fabrication process of IC's.

CO Map	Question No.	Question	Marks
CO1	Q.1	Moore's Law Plays an Important role in VLSI design	3
CO2	Q.2a	Explain Energy bands in intrinsic and extrinsic silicon;	3
	Q.2b	Explain P-N junction characteristics, I-V characteristics.	3
CO3	Q.3	What is Zener diode.	6
CO4	Q.4	What do you mean Bipolar Junction Transistor, I-V	3

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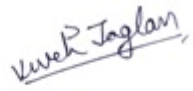
		characteristics.	
CO4	Q.5a	What is MOS capacitor.	3
	Q.5b	Explain Working of Oxidation, diffusion, ion implantation.	3
CO5	Q 6	Explain chemical vapor deposition, sputtering.	6

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

ECE301							
ELECTRONIC DEVICES							
Max Marks	CE Weightage (%)	ET Weightage (%)	GO	GP	ACU	ECU	U3G3
100	30	70	B	6	3	3	18
100	30	70	A	9	3	3	27
Total No. of Students			=	2			
Total No. of Students			>60% marks	1	50		
Attainment Level					Level 1		



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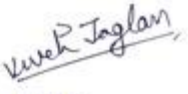

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
Course Handout
Course : NETWORK THEORY
Course Code : ECE303, Crédits : 03, Session :2023-24(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Narendra Kumar Garg

J. Introduction: The course intends to make the students proficient in analysing circuits and prepare the students to have a basic knowledge in the analysis of Electric Networks to solve the given circuit with various theorems and methods to distinguish between tie set and cut set methods for solving various circuits, to design various types of filters and relate various two port parameters and transform them.

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

ECE303.1. Understand basics electrical circuits with nodal and mesh analysis.

ECE303.2. Appreciate electrical network theorems.

ECE303.3. Apply Laplace Transform for steady state and transient analysis.

ECE303.4. Determine different network functions.

ECE304.5. Appreciate the frequency domain techniques.

L. Programme Outcomes:

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

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[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **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

M. Programme Specific Outcomes:

PSO 1: Professional Skills: An ability to apply the knowledge to understand, analyze and develop complex Engineering solutions in the field of Electronic Devices, Electronics Networks, Analog and Digital circuits, and Telecommunication Communication networks.

PSO 2: Problem-solving skills: An ability to apply standard practices and strategies in hardware and software project development using necessary hardware skills and open ended programming

environments to deliver a quality product in multidisciplinary domain.

PSO 3: Successful career and Entrepreneurship: An ability to employ modern technology and software platforms in creating innovative career paths in Industry, as an entrepreneur and a zest for higher studies.

PSO 4: Research and Development: An ability to undertake research for the development of new ideas, technology, and Engineering solutions for societal benefit.

N. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1 OR	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 studentto 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%
Total			**100%**

O. Syllabus

Module I: Basics of Network Theory:

Node and Mesh Analysis, matrix approach of network containing voltage and current sources, and reactance, source transformation and duality, Trigonometric and exponential Fourier series: Discrete spectra and symmetry of waveform, steady state response of a network to non-sinusoidal periodic inputs, power factor, effective values, Fourier transform and continuous spectra, three phase unbalanced circuit and power calculation.

Module II: Network Theorems:

Superposition, reciprocity, Thevenin's, Norton's, Maximum power Transfer, compensation and Tallegen's theorem as applied to AC. Circuits.

Module III: Laplace Transforms and its Application to Network Analysis:

Laplace transforms and properties: Partial fractions, singularity functions, waveform synthesis, analysis of RC, RL, and RLC networks with and without initial conditions with Laplace transforms evaluation of initial conditions.

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Module IV: Transient Analysis:

Transient behavior, concept of complex frequency, Driving points and transfer functions poles and zeros of immittance function, their properties, sinusoidal response from pole-zero locations, convolution theorem

Module V: Two Port Network & Filters:

Introduction, two port z-, y-, T-, h-parameters, Inter-relations among parameters, Condition for reciprocity and symmetry, Interconnections of two port networks, Behaviors of series and parallel resonant circuits, Introduction to band pass, low pass, high pass and band reject filters.

Module VI: Graph Theory and Network equations:

Graph of a network, Trees, Co-trees and loops, Cut set matrix, Tie set matrix, number of possible trees of a graph, duality, Loop Analysis and Node Analysis.

P. 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

Q. Suggested Text/Reference Books:

- Van, Valkenburg.; "Network analysis" ; Prentice hall of India, 2000.
- Sudhakar, A., Shyammohan, S. P.; "Circuits and Network"; Tata McGraw-Hill New Delhi, 1994
- A William Hayt, "Engineering Circuit Analysis" 8th Edition, McGraw-Hill Education

R. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Node Analysis	Lecture	ECE303.1	Mid Term-1, Quiz & End Sem Exam
2	Mesh Analysis	Lecture	ECE303.1	Mid Term-1, Quiz & End Sem Exam
3	matrix approach of network containing voltage and current sources, and reactance	Lecture	ECE303.1	Mid Term-1, Quiz & End Sem Exam
4	source transformation and duality	Lecture	ECE303.1	Mid Term-1, Quiz & End Sem Exam
5	Trigonometric and exponential Fourier series: Discrete spectra and symmetry of waveform	Lecture	ECE303.5	Mid Term-1, Quiz & End Sem Exam
6	Fourier transform and continuous spectra	Lecture	ECE303.5	Mid Term-1, Quiz & End Sem Exam

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7	three phase unbalanced circuit and power calculation	Lecture	ECE303.1	Mid Term-1, Quiz & End Sem Exam
8	Superposition theorem as applied to AC. circuits	Lecture	ECE303.2	Mid Term-1, Quiz & End Sem Exam
9	reciprocity theorem as applied to AC. circuits	Lecture	ECE303.2	Mid Term-1, Quiz & End Sem Exam
10	Thevenin's theorem as applied to AC. circuits	Lecture	ECE303.2	Mid Term-1, Quiz & End Sem Exam
11	Norton's theorem as applied to AC. circuits	Lecture	ECE303.2	Mid Term-1, Quiz & End Sem Exam
12	Maximum power Transfer theorem as applied to AC. circuits	Lecture	ECE303.2	Mid Term-1, Quiz & End Sem Exam
13	compensation and Tallegen's theorem as applied to AC. circuits	Lecture	ECE303.2	Mid Term-1, Quiz & End Sem Exam
14	compensation and Tallegen's theorem as applied to AC. circuits	Lecture	ECE303.2	Mid Term-1, Quiz & End Sem Exam
15	Laplace transforms and properties: Partial fractions, singularity functions, waveform synthesis	Lecture	ECE303.3	Mid Term-1, Quiz & End Sem Exam
16	Laplace transforms and properties: Partial fractions, singularity functions, waveform synthesis	Lecture	ECE303.3	Mid Term-1, Quiz & End Sem Exam
17	Laplace transforms and properties: Partial fractions, singularity functions, waveform synthesis	Lecture	ECE303.3	Mid Term-1, Quiz & End Sem Exam
18	analysis of RC, RL, and RLC networks with and without initial conditions with Laplace transforms evaluation of initial conditions.	Lecture	ECE303.3	Mid Term-1, Quiz & End Sem Exam
19	analysis of RC, RL, and RLC networks with and without initial conditions with Laplace transforms evaluation of initial conditions.	Lecture	ECE303.3	Mid Term-1, Quiz & End Sem Exam
20	analysis of RC, RL, and RLC	Lecture	ECE303.3	Mid Term-1, Quiz

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	networks with and without initial conditions with Laplace transforms evaluation of initial conditions.			& End Sem Exam
21	Transient behavior, concept of complex frequency	Lecture	ECE303.3	Mid Term-2, Quiz & End Sem Exam
22	Driving points and transfer functions	Lecture	ECE303.4	Mid Term-2, Quiz & End Sem Exam
23	poles and zeros of immittance function, their properties	Lecture	ECE303.4	Mid Term-2, Quiz & End Sem Exam
24	sinusoidal response from pole-zero locations	Lecture	ECE303.4	Mid Term-2, Quiz & End Sem Exam
25	convolution theorem	Lecture	ECE303.3	Mid Term-2, Quiz & End Sem Exam
26	convolution theorem	Lecture	ECE303.3	Mid Term-2, Quiz & End Sem Exam
27	Introduction, two port z-, y-, T-, h-parameters	Lecture	ECE303.4	Mid Term-2, Quiz & End Sem Exam
28	Introduction, two port z-, y-, T-, h-parameters	Lecture	ECE303.4	Mid Term-2, Quiz & End Sem Exam
29	Inter-relations among parameters	Lecture	ECE303.4	Mid Term-2, Quiz & End Sem Exam
30	Condition for reciprocity and symmetry	Lecture	ECE303.4	Mid Term-2, Quiz & End Sem Exam
31	Interconnections of two port networks	Lecture	ECE303.4	Mid Term-2, Quiz & End Sem Exam
32	Behaviors of series and parallel resonant circuits, Introduction to band pass, low pass, high pass and band reject filters	Lecture	ECE303.5	Mid Term-2, Quiz & End Sem Exam
33	Behaviors of series and parallel resonant circuits, Introduction to band pass, low pass, high pass and band reject filters	Lecture	ECE303.5	Mid Term-2, Quiz & End Sem Exam
34	Graph of a network, Trees, Co-trees and loops	Lecture	ECE303.1	Mid Term-2, Quiz & End Sem Exam
35	Cut set matrix, Tie set matrix, number of possible trees of a	Lecture	ECE303.1	Mid Term-2, Quiz & End Sem Exam
36	Loop Analysis and Node Analysis	Lecture	ECE303.1	Mid Term-2, Quiz & End Sem Exam

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

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CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
ECE303.1	Understand basics electrical circuits with nodal and mesh analysis.	3	3	3	1	-	-	-	-	2	-	-	-	3	3	-	1
ECE303.2	Appreciate electrical network theorems.	3	3	3	2	-	-	-	-	-	-	-	-	3	3	-	1
ECE303.3	Apply Laplace Transform for steady state and transient analysis.	3	3	2	2	2	-	-	-	3	-	3	1	3	3	-	-
ECE303.4	Determine different network functions.	3	3	2	3	2	-	-	-	1		2	1	3	-	-	-
ECE303.5	Appreciate the frequency domain techniques. of functions of several variables	2	2	1	2	3	-	-	-	2	-	2	1	-	-	-	-

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering I MID-SEMESTER (SEM –III) 2023-24
Class: B.Tech.(ECE) III Semester

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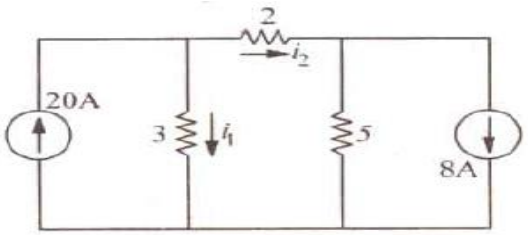
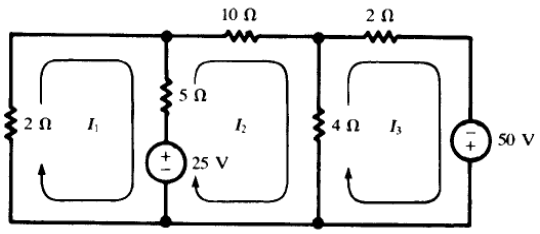
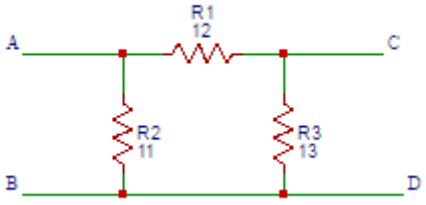
Subject Name: ECE303 NETWORK THEORY		Time: 1.5 Hrs		Max. Marks: 30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to
CO1: Understand basics electrical circuits with nodal and mesh analysis.
CO2: Appreciate electrical network theorems.

CO Map	Question No.	Question	Marks
CO2	Q.1	Explain the Thevenin Theorem with the help of Suitable Example.	3
CO1	Q.2a	By Using source transformation technique find the current flowing through the 2 Ω resistor in Figure. 	3
	Q.2b	Explain KCL & KVL with the help of suitable example.	3
CO1	Q.3	Write the mesh current matrix equation for the network of Figure by inspection and solve for the currents. 	6
CO1	Q.4	Convert the delta network of Figure into star network and find all the values of resistances. 	3
CO2	Q.5a	Find the current flowing in the 40Ω load resistor using Norton's theorem in Figure.	3

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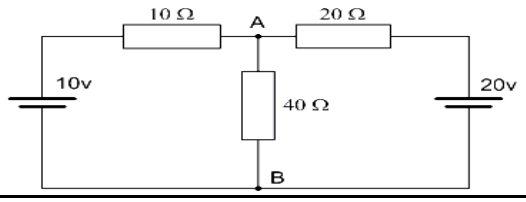
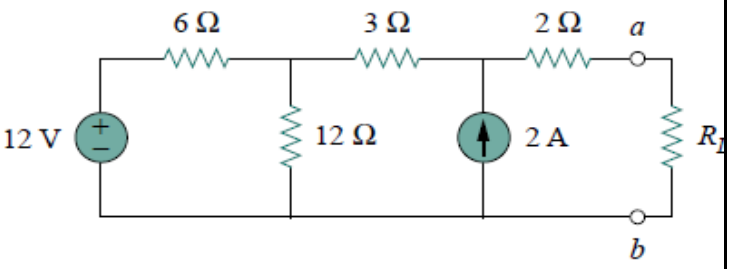
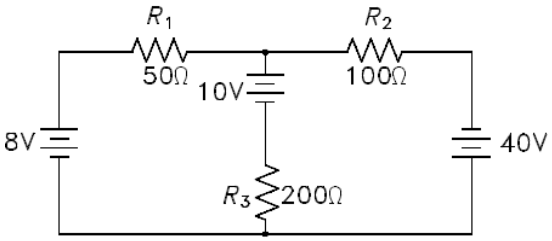
			
	Q.5b	Find the value of RL for maximum power transfer in the circuit of Figure-5. Find the maximum power also. 	3
CO1	Q 6	With reference to given Figure, calculate all loop currents using mesh analysis. 	6

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

ECE303							
NETWORK THEORY							
Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U4G4
100	30	70	A	9	3	3	27
100	30	70	A+	10	3	3	30
Total No. of Students			=	2			

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Total No. of Students	>60% marks	2	100
Attainment Level			Level 3

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Course Handout

Course : SIGNALS AND SYSTEMS

Course Code : ECE304, Crédits : 03, Session :2023-24(Odd Sem.), Class : B.Tech. 2nd Year

Faculty Name : Dr. Narendra Kumar Garg

T. Introduction: The objective of the course is to provide knowledge of Signals and Systems to students of ECE. This Course includes good insight of types of signals and types of systems, various operations performed on them through the use of Fourier series, Fourier transform, z transform.

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

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ECE304.1. Analyse different types of signals.

ECE304.2. Represent continuous and discrete systems in time and frequency domain using different transforms. Investigate whether the system is stable Sampling and reconstruction of a signal.

V. Programme Outcomes:

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in

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independent and life-long learning in the broadest context of technological change

W. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to apply the knowledge to understand, analyze and develop complex Engineering solutions in the field of Electronic Devices, Electronics Networks, Analog and Digital circuits, and Telecommunication Communication networks.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in hardware and software project development using necessary hardware skills and open-ended programming environments to deliver a quality product in multidisciplinary domain.

PSO3. Successful career and Entrepreneurship: An ability to employ modern technology and software platforms in creating innovative career paths in Industry, as an Entrepreneur and a zest for higher studies.

PSO4.Research and Development: An ability to undertake research for the development of new ideas, technology and Engineering solutions for societal benefit.

X. 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 studentto 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%
Total			**100%**

Syllabus

Module I: Signals and Systems

Signals and systems as seen in everyday life and in various branches of engineering and science, Energy, power signals, continuous and discrete time signals, continuous and discrete amplitude signals. System properties: linearity: additive and homogeneity, shift-invariance, causality, stability, reliability. Operations performed on them, even and odd signals, periodic and non-periodic signals, deterministic and random signals, energy signals, power signals, elementary signals: impulse, step, ramp and exponentials, classification of systems.

Module II: LTI system

Linear shift-invariant (LSI) systems, impulse response and step response, convolution, input- output behavior with aperiodic convergent inputs, Characterization of causality and stability of linear shift-invariant systems, System representation through differential equations and difference equations.

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Module III: Fourier series and Fourier Transform

Periodic and semi-periodic inputs to an LSI system, the notion of a frequency response and its relation to the impulse response, Fourier series representation, the Fourier Transform, convolution/ multiplication and their effect in the frequency domain, magnitude and phase response, Fourier domain duality. The Discrete-Time Fourier Transform (DTFT) and the Discrete Fourier Transform (DFT) Parseval's Theorem. The idea of signal space and orthogonal base

Module IV: Laplace Transform and Introduction to State Space Analysis

The Laplace Transform, notion of eigen functions of LSI systems, a basis of eigen functions, region of convergence, poles and zeros of system, Laplace domain analysis, solution to differential equations and system behavior. State-space analysis, multi-input and multi-output representation, the state-transition matrix and its role

.

Module V: Z- Transform and The Sampling Theorem and its Implications

The z-Transform for discrete time signals and systems- Eigen functions, region of convergence, z-domain analysis, Inverse Z Transform The Sampling Theorem and its implications- Spectra of sampled signals, Reconstruction: ideal interpolator, zero-order hold, first-order hold, and so on, Aliasing and its effects. Relation between continuous and discrete time systems.

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

Y. Suggested Text/Reference Books:

- Alan.V Oppenheim, Signals and Systems, 4th Edition 2007, Pearson Prentice Hall Publication.
- K.M. Soni, Signals and Systems; 3rd Edition, S.K. Kataria & Sons Publication.
- P. Ramesh Babu, Signal and Systems, 3rd Edition, Scitech Publications (INDIA) Pvt. Ltd.
- Simon Haykin, Signals and Systems, 2nd Edition, Willy Publications.
- B.P.Lathi, Linear Systems & Signals, 2nd Edition, Oxford Publication.
- Roberts, Fundamentals of Signals and Systems, TMH Publication

Z. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Signals and systems as seen in everyday life and in various branches of engineering and science	Lecture	ECE 304.1	Mid Term-1, Quiz & End Sem Exam
2	Energy, power signals, continuous and discrete time signals	Lecture	ECE 304.1	Mid Term-1, Quiz & End Sem Exam
3	Continuous and discrete amplitude signals	Lecture	ECE 304.1	Mid Term-1, Quiz & End Sem Exam

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4	System properties: linearity: additive and homogeneity, shift-invariance, causality, stability, reliability	Lecture	ECE 304.1	Mid Term-1, Quiz & End Sem Exam
5	Operations performed on them, even and odd signals, periodic and non-periodic signals	Lecture	ECE 304.1	Mid Term-1, Quiz & End Sem Exam
6	deterministic and random signals, energy signals, power signals, elementary signals: impulse	Lecture	ECE 304.1	Mid Term-1, Quiz & End Sem Exam
7	Step, ramp and exponentials, classification of systems	Lecture	ECE 304.1	Mid Term-1, Quiz & End Sem Exam
8	Linear shift-invariant (LSI) systems, impulse response and step response	Lecture	ECE 304.1	Mid Term-1, Quiz & End Sem Exam
9	Convolution, input- output behavior with aperiodic convergent inputs	Lecture	ECE 304.1	Mid Term-1, Quiz & End Sem Exam
10	Convolution, input- output behavior with aperiodic convergent inputs	Lecture	ECE 304.1	Mid Term-1, Quiz & End Sem Exam
11	Characterization of causality and stability of linear shift-invariant systems	Lecture	ECE 304.1	Mid Term-1, Quiz & End Sem Exam
12	Characterization of causality and stability of linear shift-invariant systems	Lecture	ECE 304.1	Mid Term-1, Quiz & End Sem Exam
13	System representation through differential equations and difference equations.	Lecture	ECE 304.2	Mid Term-1, Quiz & End Sem Exam
14	System representation through differential equations and difference equations.	Lecture	ECE 304.2	Mid Term-1, Quiz & End Sem Exam
15	System representation through differential equations and difference equations.	Lecture	ECE 304.2	Mid Term-1, Quiz & End Sem Exam
16	Periodic and semi-periodic inputs to an LSI system, the notion of a frequency response and its relation to the impulse response	Lecture	ECE 304.2	Mid Term-1, Quiz & End Sem Exam
17	Fourier series	Lecture	ECE	Mid Term-1,

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	representation, the Fourier Transform		304.2	Quiz & End Sem Exam
18	Convolution/ multiplication and their effect in the frequency domain,	Lecture	ECE 304.2	Mid Term-1, Quiz & End Sem Exam
19	The Discrete-Time Fourier Transform (DTFT)	Lecture	ECE 304.2	Mid Term-1, Quiz & End Sem Exam
20	The Discrete-Time Fourier Transform (DTFT)	Lecture	ECE 304.2	Mid Term-1, Quiz & End Sem Exam
21	The Discrete Fourier Transform (DFT) Parseval's Theorem	Lecture	ECE 304.2	Mid Term-2, Quiz & End Sem Exam
22	The Discrete Fourier Transform (DFT) Parseval's Theorem	Lecture	ECE 304.2	Mid Term-2, Quiz & End Sem Exam
23	The Laplace Transform, notion of eigen functions of LSI systems	Lecture	ECE 304.2	Mid Term-2, Quiz & End Sem Exam
24	The Laplace Transform, notion of eigen functions of LSI systems	Lecture	ECE 304.2	Mid Term-2, Quiz & End Sem Exam
25	Basis of eigen functions, region of convergence	Lecture	ECE 304.2	Mid Term-2, Quiz & End Sem Exam
26	Basis of eigen functions, region of convergence	Lecture	ECE 304.2	Mid Term-2, Quiz & End Sem Exam
27	Poles and zeros of system, Laplace domain analysis	Lecture	ECE 304.2	Mid Term-2, Quiz & End Sem Exam
28	State-space analysis, multi-input and multi-output representation, the state-transition matrix and its role	Lecture	ECE 304.2	Mid Term-2, Quiz & End Sem Exam
29	State-space analysis, multi-input and multi-output representation, the state-transition matrix and its role	Lecture	ECE 304.2	Mid Term-2, Quiz & End Sem Exam
30	The z-Transform for discrete time signals and systems- Eigen functions.	Lecture	ECE 304.2	Mid Term-2, Quiz & End Sem Exam

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31	Region of convergence, z-domain analysis, Inverse Z Transform.	Lecture	ECE 304.2	Mid Term-2, Quiz & End Sem Exam
32	The Sampling Theorem and its implications- Spectra of sampled signals.	Lecture	ECE 304.2	Mid Term-2, Quiz & End Sem Exam
33	Reconstruction: ideal interpolator, zero-order hold, first-order hold.	Lecture	ECE 304.2	Mid Term-2, Quiz & End Sem Exam
34	Reconstruction: ideal interpolator, zero-order hold, first-order hold.	Lecture	ECE 304.2	Mid Term-2, Quiz & End Sem Exam
35	Aliasing and its effects. Relation between continuous and discrete time systems	Lecture	ECE304.2	Mid Term-2, Quiz & End Sem Exam
36	Aliasing and its effects. Relation between continuous and discrete time systems	Lecture	ECE 304.2	Mid Term-2, Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
ECE304.1	Analyze different types of signals	3	3	1	3	1	-	-	-	2	-	2	1	-	1	2	-

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ECE304.2	Represent continuous and discrete systems in time and frequency domain using different transforms Investigate whether the system is stable Sampling and reconstruction of a signal.	3	2	2	2	2	-	-	-	2	-	1	1	-	2	1	-

Sample Question Paper

Amity School of Engineering and Technology Department of Computer Science and Engineering I MID-SEMESTER (SEM –III) 2023-24						
Class: B.Tech.(ECE) III Semester						
Subject Name: ECE304 Signal & Systems		Time: 1.5 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		
Student will be able to CO1: Analyze different types of signals. CO2:Represent continuous and discrete systems in time and frequency domain using different transforms Investigate whether the system is stable Sampling and reconstruction of a signal						

CO Map	Question No.	Question	Marks
CO1	Q.1	What are the properties of the impulse signal? Explain.	3
CO1	Q.2a	Explain the various operations on the signals with an example?	3
	Q.2b	Describe even and odd signal with an example.	3
CO1	Q.3	Find whether Signals 2+ sin 4 πt and $x(t) = 2Cos(t + \pi / 4)$ is periodic or not, if periodic find fundamental period.	6
CO1	Q.4	Determine the power of signal x (t) = 2sin (100πt).	3

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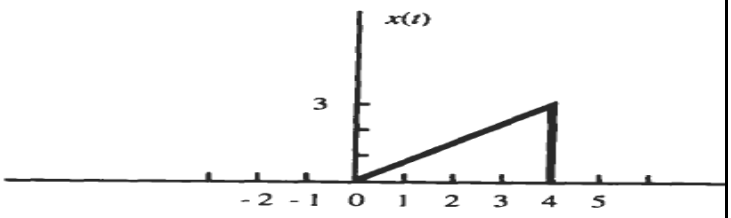
CO1	Q.5a	State whether the following system is static, linear, causal, time-invariant, and stable: y(n)+ +y(n-1) = x(n)+x(n-2)	3
	Q.5b	Explain the convolution of two signals?	3
CO1	Q 6	. A continuous time signal x (t) is shown in figure below. Sketch and label each of the following signals. (i) x (t/4) (ii) 6 x (-t) iii) 0.5 x (t+1) iv) x (-t+3) 	6

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

ECE304							
SIGNALS AND SYSTEMS							
Max Marks	CE Weightage (%)	ET Weightage (%)	GO	GP	ACU	ECU	U5G5
100	30	70	B	6	3	3	18
100	30	70	A	9	3	3	27
Total No. of Students			=	2			
Total No. of Students			>60% marks	1	50		
Attainment Level					Level 1		

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

Course Code : ECE 323, Crédits : 01, Session :2023-24(Odd Sem.), Class : B.Tech. 2nd Year

Faculty Name : Dr. Narendra Kumar Garg

A. Introduction: The purpose of this laboratory course is to make the students proficient in analyzing circuits and prepare the students to have a basic knowledge in the analysis of Electric Networks to solve the given circuit with various theorems and methods to distinguish between tie set and cut set methods for solving various circuits, to design various types of filters and relate various two port parameters and transform them.

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

ECE 323.1. Understand basics electrical circuits with nodal and mesh analysis.

ECE 323.2. Appreciate and apply electrical network theorems.

ECE 323.3. Apply Laplace Transform for steady state and transient analysis.

ECE 323.4. Determine different network functions.

ECE 323.5. Appreciate the frequency domain techniques.

C. Programme Outcomes:

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences,

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and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **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

D. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to apply the knowledge to understand, analyze and develop complex Engineering solutions in the field of Electronic Devices, Electronics Networks, Analog and Digital circuits, and Telecommunication Communication networks.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in hardware and software project development using necessary hardware skills and open-ended programming environments to deliver a quality product in multidisciplinary domain.

PSO3. Successful career and Entrepreneurship: An ability to employ modern technology and software

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platforms in creating innovative career paths in Industry, as an Entrepreneur and a zest for higher studies.

PSO4.Research and Development: An ability to undertake research for the development of new ideas, technology and Engineering solutions for societal benefit.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term Viva	CT	15%
	Mid Term Performance		
	Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a studentto 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 Practical Examination	EE	70%
Total			**100%**

F. Course Contents:

G.

1. To verify Thevenin's theorem in a given network.
2. To verify reciprocity theorem in a given network.
3. To verify maximum power transfer theorem in a given network.
4. To verify Tellegen's theorem in a given network.
5. To determine the Z- and Y- parameters of a resistive two-port network.
6. To determine the T- (ABCD) parameters of a resistive two-port network.
7. To determine the h- parameters of a resistive two-port network.
8. To design series-series connection of 2 two-port networks and determine its Z- parameters.
9. To design parallel-parallel connection of 2 two-port networks and determine its Y- parameters.
10. To design a cascade connection of 2 two-port networks and determine its T- (ABCD) parameters.

Examination Scheme:

	IA				EE	
Components	**A**	**PR**	**LR**	**V**	**PR**	**V**
Weightage (%)	5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

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H. Experiment Plan

Experiment	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	To verify Thevenin's theorem in a given network.	Practical	ECE 323.1	Mid Term Viva-1, Quiz & End Sem Pect. Exam
2	To verify reciprocity theorem in a given network.	Practical	ECE 323.1	Mid Term Viva-1, Quiz & End Sem Pect. Exam
3	To verify maximum power transfer theorem in a given network.	Practical	ECE 323.1	Mid Term Viva-1, Quiz & End Sem Pect. Exam
4	To verify Tellegen's theorem in a given network.	Practical	ECE 323.1	Mid Term Viva-1, Quiz & End Sem Pect. Exam
5	To determine the Z- and Y-parameters of a resistive two-port network.	Practical	ECE 323.2	Mid Term Viva-2, Quiz & End Sem Pect. Exam
6	To determine the Z- and Y-parameters of a resistive two-port network.	Practical	ECE 323.2	Mid Term Viva-2, Quiz & End Sem Pect. Exam
7	To determine the T-(ABCD) parameters of a resistive two-port network.	Practical	ECE 323.2	Mid Term Viva-2, Quiz & End Sem Pect. Exam
8	To determine the h-parameters of a resistive two-port network.	Practical	ECE 323.2	Mid Term Viva-2, Quiz & End Sem Pect. Exam
9	To design series-series connection of 2 two-port networks and determine its Z- parameters.	Practical	ECE 323.3	Mid Term Viva-3, Quiz & End Sem Pect. Exam
10	To design series-series connection of 2 two-port networks and determine its Z- parameters.	Practical	ECE 323.3	Mid Term Viva-3, Quiz & End Sem Pect. Exam
11	To design parallel-parallel connection of 2 two-port networks and determine its Y- parameters.	Practical	ECE 323.3	Mid Term Viva-3, Quiz & End Sem Pect. Exam
12	To design a cascade connection of 2 two-port networks and determine its T- (ABCD) parameters.	Practical	ECE 323.3	Mid Term Viva-3, Quiz & End Sem Pect. Exam

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

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CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
ECE323.1	Understand basics electrical circuits with nodal and mesh analysis.	3	3	1	3	1				2		2	1		2	1	
ECE323.2	Appreciate and apply electrical network theorems.	3	2	2	2	2				2		1	1	1			2
ECE323.3	Apply Laplace Transform for steady state and transient analysis.																
ECE323.4	Determine different network functions.																
ECE323.5	Appreciate the frequency domain techniques.																

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering I MID-SEMESTER Viva (SEM –III) 2023-24
Class: B.Tech.(ECE) III Semester

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Subject Name: ECE 323 Network Theory Lab		Time: 2 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		

Student will be able to
CO1: Understand basics electrical circuits with nodal and mesh analysis.
CO2: Appreciate and apply electrical network theorems.
CO3: Apply Laplace Transform for steady state and transient analysis.
CO4: Determine different network functions.
CO5: Appreciate the frequency domain techniques.

CO Map	Question No.	Question	Marks
CO1	Q.1		2
CO1	Q.2a		2
	Q.2b		3
CO1	Q.3		3
CO2	Q.4		3
CO2	Q.5a		3
	Q.5b		3
CO2	Q.6		3
CO3	Q.7a		3
CO3	Q.7b		3
CO3	Q.8		2

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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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
Course Handout
Course : ANALOG AND DIGITAL COMMUNICATION
Course Code : ECE401, Crédits : 03, Session :2023-24(Even Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr Raghavendra Sharma

A. **Introduction:** The purpose of this course is to provide a thorough introduction to analog and digital communications with an in depth study of various modulation techniques, Random processes are discussed, and information theory is introduced.

B. **Course Outcomes**: At the end of the course, students will demonstrate the ability to:

ECE401.1. Analyze and compare different analog modulation schemes for their efficiency and bandwidth
ECE401.2. Analyze the behavior of a communication system in presence of noise
ECE401.3. Investigate pulsed modulation system and analyze their system performance
ECE401.4. Analyze different digital modulation schemes and can compute the bit error performance

C. **Programme Outcomes:**

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an

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understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **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

D. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to apply the knowledge to understand, analyze and develop complex Engineering solutions in the field of Electronic Devices, Electronics Networks, Analog and Digital circuits, and Telecommunication Communication networks.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in hardware and software project development using necessary hardware skills and open-ended programming environments to deliver a quality product in multidisciplinary domain.

PSO3. Successful career and Entrepreneurship: An ability to employ modern technology and software platforms in creating innovative career paths in Industry, as an Entrepreneur and a zest for higher studies.

PSO4.Research and Development: An ability to undertake research for the development of new ideas, technology and Engineering solutions for societal benefit.

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	10%

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Attendance	A minimum of 75% Attendance is required to be maintained by a studentto 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%
Total			**100%**

F. Syllabus

Module I: Analog Modulation Techniques: Amplitude Modulation: (8 Hours)
Review of signals and systems, Frequency domain representation of signals, Principles of Amplitude Modulation Systems: DSB-SC, Amplitude modulation with full carrier (DSB-C), Single side band transmission (SSB), Synchronous detection, Envelope detection, effect of frequency and phase errors in synchronous detection, Vestigial side band transmission (VSB).

Module II: Analog Modulation Techniques: Frequency Modulation: (6 Hours)
Angle Modulation, Narrow and wide band FM, BW calculations using Carson rule, Direct & Indirect FM generations, Representation of FM and PM signals, Spectral characteristics of angle modulated signals.

Module III: Digital Modulation Techniques: (8 Hours)
Pulse modulation, Sampling process, Baseband Pulse Transmission- Inter symbol Interference and Nyquist criterion, Pulse Amplitude and Pulse code modulation (PCM), Differential pulse code modulation, Delta modulation, Time Division multiplexing, Digital Multiplexers, Digital Modulation schemes- Phase Shift Keying, Frequency Shift Keying, Quadrature Amplitude Modulation, Continuous Phase Modulation and Minimum Shift Keying, Digital Modulation tradeoffs.

Module IV: Noise in Communication System: (8 Hours)
Review of probability and random process. Gaussian and white noise characteristics, Noise in amplitude modulation systems, Noise in Frequency modulation systems. Different types of noise, noise calculations, equivalent noise band width, noise figures, effective noise temperature, noise figure. Pre-emphasis and De- emphasis, Threshold effect in angle modulation.

G. 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

H. Suggested Text/Reference Books:

- Haykin S., "Communications Systems", John Wiley and Sons, 2001.
- Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education, 2002.
- Taub H. and Schilling D.L., "Principles of Communication Systems", Tata McGraw Hill, 2001.
- Wozencraft J. M. and Jacobs I. M., ``Principles of Communication Engineering'', John Wiley, 1965.
- Barry J. R., Lee E. A. and Messerschmitt D. G., ``Digital Communication'', Kluwer Academic Publishers, 2004.
- Proakis J.G., ``Digital Communications'', 4th Edition, McGraw Hill, 2000

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I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Review of signals and systems	Lecture	ECE401.1	Mid Term-1, Quiz & End Sem Exam
2	Frequency domain representation of signals	Lecture	ECE401.1	Mid Term-1, Quiz & End Sem Exam
3	Principles of Amplitude Modulation Systems: DSB-SC	Lecture	ECE401.1	Mid Term-1, Quiz & End Sem Exam
4	Amplitude modulation with full carrier (DSB-C)	Lecture	ECE401.1	Mid Term-1, Quiz & End Sem Exam
5	Single side band transmission (SSB)	Lecture	ECE401.1	Mid Term-1, Quiz & End Sem Exam
6	Synchronous detection, Envelope detection	Lecture	ECE401.1	Mid Term-1, Quiz & End Sem Exam
7	effect of frequency and phase errors in synchronous detection	Lecture	ECE401.1	Mid Term-1, Quiz & End Sem Exam
8	Vestigial side band transmission (VSB)	Lecture	ECE401.1	Mid Term-1, Quiz & End Sem Exam
9	Numerical	Tutorial	ECE401.1	Mid Term-1, Quiz & End Sem Exam
10	Numerical	Tutorial	ECE401.1	Mid Term-1, Quiz & End Sem Exam
11	Angle Modulation	Lecture	ECE401.1	Mid Term-1, Quiz & End Sem Exam
12	Narrow and wide band FM	Lecture	ECE401.1	Mid Term-1, Quiz & End Sem Exam
13	BW calculations using Carson rule	Tutorial	ECE401.1	Mid Term-1, Quiz & End Sem Exam
14	Direct & Indirect FM generations	Quiz	ECE401.1	Mid Term-1, Quiz & End Sem Exam
15	Representation of FM and PM signals	Lecture	ECE401.1	Assignment & End Sem Exam
16	Spectral characteristics of angle modulated signals	Lecture	ECE401.1	Assignment & End Sem Exam
17	Numerical	Tutorial	ECE401.1	Assignment & End Sem Exam
18	Pulse modulation, Sampling process	Lecture	ECE401.3	Assignment & End Sem Exam
19	Baseband Pulse Transmission- Inter symbol Interference and Nyquist criterion	Lecture	ECE401.3	Assignment & End Sem Exam
20	Pulse Amplitude and Pulse code modulation (PCM)	Lecture	ECE401.3	Assignment & End Sem Exam

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21	Pulse Amplitude and Pulse code modulation (PCM)	Lecture	ECE401.3	Assignment & End Sem Exam
22	Differential pulse code modulation	Lecture	ECE401.3	Assignment & End Sem Exam
23	Delta modulation	Lecture	ECE401.3	Assignment & End Sem Exam
24	Time Division multiplexing, Digital Multiplexers	Lecture	ECE401.3	-
25	Digital Modulation schemes- Phase Shift Keying, Frequency Shift Keying	Assignment	ECE401.4	-
26	Quadrature Amplitude Modulation	Lecture	ECE401.4	Quiz & End Sem Exam
27	Continuous Phase Modulation and Minimum Shift Keying	Lecture	ECE401.4	Quiz & End Sem Exam
28	Digital Modulation tradeoffs	Lecture	ECE401.4	Quiz & End Sem Exam
29	Numerical	Tutorial	ECE401.4	Quiz & End Sem Exam
30	Review of probability and random process	Lecture	ECE401.2	Quiz & End Sem Exam
31	Gaussian and white noise characteristics	Lecture	ECE401.2	Quiz & End Sem Exam
32	Noise in amplitude modulation systems	Lecture	ECE401.2	Quiz & End Sem Exam
33	Noise in Frequency modulation systems	Lecture	ECE401.2	Quiz & End Sem Exam
34	calculations, equivalent noise band width, noise figures, effective noise temperature	Lecture	ECE401.2	Quiz & End Sem Exam
35	Pre-emphasis and Deemphasis, Threshold effect in angle modulation	Lecture	ECE401.2	-
36	Numerical	Tutorial	ECE401.2	-

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PS	PS	PS	PS

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		1	2	3	4	5	6	7	8	9	10	11	12	O1	O2	O3	O4
ECE401.1.	Analyze and compare different analog modulation schemes for their efficiency and bandwidth	3	**3**	**3**	**1**	2	**1**	**2**	**-**	**1**	**1**	**-**	**2**	**3**	**3**	**2**	**3**
ECE401.2	Analyze the behavior of a communicatio n system in presence of noise	3	**3**	**-**	2	**3**	**1**	**3**	**-**	-	**-**	2	**1**	**2**	**3**	**1**	**3**
ECE401.3	Investigate pulsed modulation system and analyze their system performance	3	**2**	**2**	**1**	**2**	**2**	**-**	**-**	-	**2**	**1**	**1**	**3**	**3**	**2**	**3**
ECE401.4	Analyze different digital modulation schemes and can compute the bit error performance	3	2	**2**	**-**	**2**	**2**	**-**	**-**	-	**2**	**1**	**1**	**3**	**3**	**2**	**3**

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Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering I MID-SEMESTER (SEM –IV) 2023-24						
Class: B.Tech.(ECE) IV Semester						
Subject Name: ECE 401 Analog & Digital Communication		Time: 1.5 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1-10,13,15	Q.11,12	Q.14	Q.16,17		Q.18

Student will be able to
CO1: Analyze and compare different analog modulation schemes for their efficiency and bandwidth
CO2: Analyze the behavior of a communication system in presence of noise

CO Map	Question No.	Question	Marks
CO1	Q.1-10	Multiple choice 10 questions	5
CO1	Q. 11	Explain the Block diagram of communication system. What is the need of modulation?	3
	Q.12	An AM broadcast radio transfer radiates at 10K watts of power if modulation percentage is 60. Calculate how much of this is the carrier power.	3
CO1	Q.13	Prove that the efficiency in case full AM= $\frac{\mu^2}{\mu^2+2}$	3
CO2	Q.14	Differentiate between NBFM and WBFM.	3
CO1	Q.15	How a FM wave can be converted to PM wave. Explain with proper block diagram.	3
CO2	Q.16	Explain the technique for AM generation along with a suitable block diagram and give the condition for this signal to be demodulated with envelop detector.	5
CO1	Q.17	Explain the working of vestigial side band modulation with the help of suitable diagram.	5
CO1	Q.18	Find out the BW of angle modulated signal given by the equation:	5

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		$x(t) = 10\ Cos[2\pi\ 10^8 t + 200\ Cos 2\pi\ 10^3 t\ ]$	

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

ECE401							
ANALOG AND DIGITAL COMMUNICATION							
Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U3G3
100	30	70	B	6	3	3	18
100	30	70	A	9	3	3	27
Total No. of Students			=	2			
Total No. of Students			>60% marks	1	50		
Attainment Level					Level 1		

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
Course Handout
Course : MICROCONTROLLERS
Course Code : ECE403, Crédits : 03, Session :2023-24(Even Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mrs Rinkoo Bhatia

BB. Introduction: This course deals with the systematic study of the Architecture and programming issues of 8085-microprocessor and 8051 microcontroller family. The aim of this course is to give the students basic knowledge of the above microprocessor needed to develop the systems using it.

CC. Course Outcomes: At the end of the course, students will demonstrate the ability to:

ECE403.1. Do assembly language programming
ECE403.*2*. Do interfacing design of peripherals like, I/O, A/D, D/A, timer etc.
ECE403.3. Develop systems using different microcontrollers
ECE404.4. Understand RISC processors and design ARM microcontroller based systems

DD. Programme Outcomes:

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering

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solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **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

EE. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to apply the knowledge to understand, analyze and develop complex Engineering solutions in the field of Electronic Devices, Electronics Networks, Analog and Digital circuits, and Telecommunication Communication networks.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in hardware and software project development using necessary hardware skills and open-ended programming environments to deliver a quality product in multidisciplinary domain.

PSO3. Successful career and Entrepreneurship: An ability to employ modern technology and software platforms in creating innovative career paths in Industry, as an Entrepreneur and a zest for higher studies.

PSO4.Research and Development: An ability to undertake research for the development of new ideas, technology and Engineering solutions for societal benefit.

FF. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a studentto be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	A	5%

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End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

GG. Syllabus

Module 1: Overview of Microprocessor Systems: (08 Hours)

Overview of microcomputer systems and their building blocks, memory interfacing, concepts of interrupts and Direct Memory Access, instruction sets of microprocessors (with examples of 8085 and 8086);Interfacing with peripherals - timer, serial I/O, parallel I/O, A/D and D/ A converters; Arithmetic Coprocessors; System level interfacing design;

Module II: Advanced Microprocessor and Memory Systems: (06 Hours)

Concepts of virtual memory, Cache memory, Advanced coprocessor Architectures- 286, 486, Pentium; Introduction to RISC processors;

Module III: 8051 Microcontroller: (08 Hours)

Features, architecture, Pin Diagram, Interrupts, Interrupt structure and priorities, Port structure and operation, memory organization, external memory interfacing, instruction syntax, data types, subroutines, addressing Modes, instruction set, ALP of 8051

Module IV: 8051 Microcontroller Interfacing and Applications: (08 Hours)

Programming 8051 Timers and Serial port programming, 8051 interfacing to ADC and DAC, stepper motor and Sensors. Serial Communication,Modes and Programming, ARM microcontrollers interface designs.

HH. 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

II. Suggested Text/Reference Books:

- R. S. Gaonkar, Microprocessor Architecture: Programming and Applications with the 8085/8080A, Penram International Publishing, 1996
- D A Patterson and J H Hennessy, "Computer Organization and Design The hardware and software interface. Morgan Kaufman Publishers.
- Douglas Hall, Microprocessors Interfacing, Tata McGraw Hill, 1991.
- Kenneth J. Ayala, the 8051 Microcontroller, Penram International Publishing, 1996.

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JJ. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Module 1: Overview of Microprocessor Systems, Introduction to syllabu,s books	Lecture	**ECE403.1, 2**	Mid Term, Test & End Sem Exam
2	Overview of microcomputer systems and their building blocks	Lecture	**ECE403.1, 2**	Mid Term, Test & End Sem Exam
3	memory interfacing	Lecture	**ECE403.1, 2**	Mid Term, Test & End Sem Exam
4	concepts of interrupts Direct Memory Access	Lecture	**ECE403.1, 2**	Mid Term, Test & End Sem Exam
5	sets of microprocessors (with examples of 8085 and 8086	Lecture	**ECE403.1, 2**	Mid Term, Test & End Sem Exam
6	sets of microprocessors (with examples of 8085 and 8086	Lecture	**ECE403.1, 2**	Mid Term, Test & End Sem Exam
7	Interfacing with peripherals - timer	Lecture	**ECE403.1, 2**	Mid Term, Test & End Sem Exam
8	serial I/O, parallel I/O	Lecture	**ECE403.1, 2**	Mid Term, Test & End Sem Exam
9	A/D and D/ A converters	Lecture	**ECE403.1, 2**	Mid Term, Test & End Sem Exam
10	Arithmetic Coprocessors; System level interfacing design;	Lecture	**ECE403.1, 2**	Mid Term, Test & End Sem Exam
11	Module II: Advanced Microprocessor and Memory Systems, Concepts of virtual memory	Lecture	**ECE403.1, 2**	Mid Term, Test & End Sem Exam
12	Cache memory	Lecture	**ECE403.1, 2**	Mid Term, Test & End Sem Exam
13	Advanced coprocessor Architectures- 286, 486	Lecture	**ECE403.1, 2**	Mid Term, Test & End Sem Exam
14	Advanced coprocessor Architectures- 286, 486	Lecture	**ECE403.1, 2**	Mid Term, Test & End Sem Exam
15	Pentium	Lecture	**ECE403.1, 2**	Mid Term, Test & End Sem Exam
16	Pentium	Lecture	**ECE403.1, 2**	Mid Term, Test & End Sem Exam
17	Advanced Microprocessor and Memory Systems, Introduction to RISC processors;	Lecture	**ECE403.1, 2**	Mid Term, Test & End Sem Exam

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18	Test on module I & II	Assesment	**ECE403.1, 2**	
19	Module III: 8051 Microcontroller, Features, architecture of 8051 microcontroller	Lecture	**ECE403.1, 2**	Assignment & End Sem Exam
20	architecture of 8051 microcontroller	Lecture	**ECE403.1, 2**	Assignment & End Sem Exam
21	Pin Diagram of 8051 microcontroller	Lecture	**ECE403.1, 2**	Assignment & End Sem Exam
22	, Interrupts, Interrupt structure and priorities	Lecture	**ECE403.1, 2**	Assignment & End Sem Exam
23	Port structure and operation,	Lecture	**ECE403.1, 2**	Assignment & End Sem Exam
24	memory organization, external memory interfacing	Lecture	**ECE403.1, 2**	Assignment & End Sem Exam
25	subroutines, instruction syntax, data types	Lecture	**ECE403.1, 2**	Assignment & End Sem Exam
26	, addressing Modes, instruction set, ALP of 8051	Lecture	**ECE403.1, 2**	Assignment & End Sem Exam
27	, addressing Modes, instruction set, ALP of 8051	Lecture	**ECE403.1, 2**	Assignment & End Sem Exam
28	Module IV: 8051 Microcontroller Interfacing and Applications, Programming 8051 Timers and Serial port programming	Lecture	**ECE403.3, 4**	Assignment & End Sem Exam
29	Programming 8051 Timers and Serial port programming	Lecture	**ECE403.3, 4**	Assignment & End Sem Exam
30	8051 interfacing to ADC and DAC	Lecture	**ECE403.3, 4**	Assignment & End Sem Exam
31	stepper motor and Sensors	Lecture	**ECE403.3, 4**	Assignment & End Sem Exam
32	Serial Communication,Modes and Programming	Lecture	**ECE403.3, 4**	Assignment & End Sem Exam
33	Serial Communication,Modes and Programming	Lecture	**ECE403.3, 4**	Assignment & End Sem Exam
34	ARM microcontrollers interface designs.	Lecture	**ECE403.3, 4**	Assignment & End Sem Exam
35	ARM microcontrollers interface designs.	Lecture	**ECE403.3, 4**	Assignment & End Sem Exam
36	Revision Module iii & iv	Revision		

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
ECE403.1	Do assembly language programming	3	3	3	3	3	**2**	**-**	**1**	2	**3**	2	3	**3**	**3**	**3**	**3**
ECE403.2	Do interfacing design of peripherals like, I/O, A/D, D/A, timer etc.	3	3	3	3	3	**2**	**-**	**1**	2	**3**	2	3	**3**	**3**	**3**	**3**
ECE403.3	Develop systems using different microcontrollers	3	3	3	3	3	**2**	**-**	**1**	2	**3**	2	3	**3**	**3**	**3**	**3**
ECE403.4	Understand RISC processors and design ARM microcontroller based systems	3	3	2	3	2				1		2	1	**3**	**2**	**2**	**2**

ECE403							
MICROCONTROLLERS							
Max Marks	CE Weightage (%)	ET Weightage (%)	GO	GP	ACU	ECU	U4G4
100	30	70	B+	7	3	3	21
100	30	70	A-	8	3	3	24
Total No. of Students			=	2			
Total No. of Students			>60% marks	1	50		
Attainment Level					Level 1		

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
Course Handout
Course : Electronics Workshop Lab
Course Code : ECE 425, Credits : 01, Session :2023-24(Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Ajay Kumar Dadoria

LL. Introduction: The purpose of this laboratory course is to introduce the student to the practical application and Familiarization/Identification of electronic components with specification: Functionality, type, size, colour coding, package, symbol, cost etc. (Active, Passive, Electronic, Electro-mechanical, Wires, Cables, Connectors, Fuses, Switches, Relays, Crystals, Displays, Fasteners, Heat sink etc.)

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

ECE 425.1. Perform the Testing of electronic components with the help of Multimeter, Function generator, Power supply and CRO etc.

ECE 425.2. Do assembling of electronic circuit/system on general purpose PCB.

ECE 425.3. Develop different electronic projects like Square wave generator, LED blinking circuit etc. using different electronic components.

NN. Programme Outcomes:

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

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[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **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

OO. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to apply the knowledge to understand, analyze and develop complex Engineering solutions in the field of Electronic Devices, Electronics Networks, Analog and Digital circuits, and Telecommunication Communication networks.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in hardware and software project development using necessary hardware skills and open-ended programming environments to deliver a quality product in multidisciplinary domain.

PSO3. Successful career and Entrepreneurship: An ability to employ modern technology and software platforms in creating innovative career paths in Industry, as an Entrepreneur and a zest for higher studies.

PSO4.Research and Development: An ability to undertake research for the development of new ideas, technology and Engineering solutions for societal benefit.

PP. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term Viva	CT	15%
	Mid Term Performance		

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	Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a studentto 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 Practical Examination	EE	70%
Total			**100%**

QQ. Course Contents:

1. Drawing of electronic circuit diagrams using BIS/IEEE symbols and introduction to EDA tools, Interpret data sheets of discrete components and IC's. Familiarization/Application of testing instruments and commonly used tools. [Multimeter, Function generator, Power supply, CRO etc.] [Soldering iron, De-soldering pump, Pliers, Cutters, Wire strippers, Screw drivers, Tweezers, Crimping tool, Hot air soldering and de- soldering station etc.]
2. Testing of electronic components [Resistor, Capacitor, Diode, Transistor, UJT and JFET using multimeter.
3. Inter-connection methods and soldering practice. [Bread board, Wrapping, Crimping, Soldering - types - selection of materials and safety precautions, soldering practice in connectors and general-purpose PCB.
4. Printed circuit boards (PCB) [Types, Single sided, Double sided, PTH, Processing methods, Design and fabrication of a single sided PCB for a simple circuit with manual etching (Ferric chloride) and drilling.]
5. Assembling of electronic circuit/system on general purpose PCB, test and show the functioning (Any two circuits)
   - Fixed voltage power supply with transformer, rectifier diode, capacitor filter, zener/IC regulator.
   - LED blinking circuit using a stable multi-vibrator with transistor BC 107.
   - Square wave generation using IC 555 timer in IC base.
   - Sine wave generation using IC 741 OP-AMP in IC base.
   - RC coupled amplifier with transistor BC 107. 6. AND and NAND gates in diode transistor logic.6. To measure various parameters of a directional coupler.
6. Familiarization of electronic systems:
   - Setting up of a PA system with different microphones, loud speakers, mixer etc.
   - Introduction to robotics- Familiarization of components (motor, sensors, battery etc.) used in robotics
   - To make Working Electronics Hardware project compulsorily by each student.

	IA				EE	
Components	**A**	**PR**	**LR**	**V**	**PR**	**V**
Weightage (%)	5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

RR. Experiment Plan

Experiment	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Drawing of electronic circuit diagrams using BIS/IEEE symbols and introduction to EDA tools,	Practical	ECE 425.1	Mid Term Viva-1, Quiz & End Sem Pect. Exam

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	Interpret data sheets of discrete components and IC's. Familiarization/Application of testing instruments and commonly used tools. [Multimeter, Function generator, Power supply, CRO etc.] [Soldering iron, De-soldering pump, Pliers, Cutters, Wire strippers, Screw drivers, Tweezers, Crimping tool, Hot air soldering and de- soldering station etc.]			
2	Testing of electronic components [Resistor, Capacitor, Diode, Transistor, UJT and JFET using multimeter.	Practical	ECE 425.2	Mid Term Viva-1, Quiz & End Sem Pect. Exam
3	Inter-connection methods and soldering practice. [Bread board, Wrapping, Crimping, Soldering - types -selection of materials and safety precautions, soldering practice in connectors and general-purpose PCB.	Practical	ECE 425.3	Mid Term Viva-1, Quiz & End Sem Pect. Exam
4	Printed circuit boards (PCB) [Types, Single sided, Double sided, PTH, Processing methods, Design and fabrication of a single sided PCB for a simple circuit with manual etching (Ferric chloride) and drilling.]	Practical	ECE 425.4	Mid Term Viva-1, Quiz & End Sem Pect. Exam
5	Assembling of electronic circuit/system on general purpose PCB, test and show the functioning (Any two circuits) • Fixed voltage power supply with transformer, rectifier diode, capacitor filter, zener/IC regulator. • LED blinking circuit using a stable multi-vibrator with transistor BC 107.	Practical	ECE 425.5	Mid Term Viva-2, Quiz & End Sem Pect. Exam

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	• Square wave generation using IC 555 timer in IC base. • Sine wave generation using IC 741 OP-AMP in IC base. • RC coupled amplifier with transistor BC 107. 6. AND and NAND gates in diode transistor logic.6.			
6	Familiarization of electronic systems: • Setting up of a PA system with different microphones, loud speakers, mixer etc. • Introduction to robotics- Familiarization of components (motor, sensors, battery etc.) used in robotics • To make Working Electronics Hardware project compulsorily by each student.	Practical	ECE 425.6	Mid Term Viva-2, Quiz & End Sem Pect. Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
ECE425.1	Perform the Testing of electronic components with the help of Multimeter, Function generator, Power supply and CRO etc	3	3	1	3	1				2		2	1		2	1	

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ECE425.2	Do assembling of electronic circuit/system on general purpose PCB.	3	2	2	2	2				2		1	1		2	1	
ECE425.3	Develop different electronic projects like Square wave generator, LED blinking circuit etc. using different electronic components.	3	2	2	2	2				2		1	1		2	1	

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering I MID-SEMESTER Viva (SEM –IV) 2023-24						
Class: B.Tech.(ECE) IV Semester						
Subject Name: ECE 425 Electronics Workshop Lab		Time: 2 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		

Student will be able to
CO1: Perform the Testing of electronic components with the help of Multimeter, Function generator, Power supply and CRO etc.
CO2: Do assembling of electronic circuit/system on general purpose PCB.
CO3: Develop different electronic projects like Square wave generator, LED blinking circuit etc. using different electronic components.

CO Map	Question No.	Question	Marks
CO1	Q.1	Draw the electronic circuit diagrams using BIS/IEEE symbols and introduction to EDA tools, Interpret data sheets of discrete components and IC's.	2
CO1	Q.2a	Explain the Familiarization/Application of testing instruments and commonly used tools. [Multimeter, Function generator, Power supply, CRO etc.]	2
	Q.2b	Explain Testing of electronic components [Resistor, Capacitor, Diode, Transistor, UJT and JFET using multimeter.	3

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CO2	Q.3	Explain Printed circuit boards (PCB) [Types, Single sided, Double sided, PTH, Processing methods, Design and fabrication of a single sided PCB for a simple circuit with manual etching (Ferric chloride) and drilling.]	3
CO2	Q.4	Explain Assembling of electronic circuit/system on general purpose PCB, test and show the functioning of Fixed voltage power supply with transformer, rectifier diode, capacitor filter, zener/IC regulator.	3
CO3	Q.5a	Explain LED blinking circuit using a stable multi-vibrator with transistor BC 107.?	3
	Q.5b	Explain Working of Square wave generation using IC 555 timer in IC base.	3
CO3	Q.6	Explain Sine wave generation using IC 741 OP-AMP in IC base.	3
CO3	Q.7a	Explain the RC coupled amplifier with transistor BC 107. 6. AND and NAND gates in diode transistor logic.	3
CO3	Q.7b	Explain the Familiarization of electronic systems: •Setting up of a PA system with different microphones, loud speakers, mixer etc.	3
CO3	Q.8	Explain robotics- Familiarization of components (motor, sensors, battery etc.) used in robotics.	2

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

ECE425							
ELECTRONICS WORKSHOP LAB							
Max Marks	CE Weightage (%)	ET Weightage (%)	GO	GP	ACU	ECU	U11G11
100	30	70	A	9	1	1	9
100	30	70	A+	10	1	1	10

Total No. of Students	=	2	
Total No. of Students	>60% marks	2	100
Attainment Level			Level 3

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Course Handout

Course : ELECTROMAGNETIC WAVES

Course Code : ECE501, Crédits : 03, Session :2023-24(Odd Sem.), Class : B.Tech. 3rd Year

Faculty Name : Dr. Shally Goyal

Introduction: This course provides a general introduction to the important physical concepts and mathematical methods used in treating all types of wave phenomena, but stresses electromagnetic signal propagation and issues of central importance in electrical engineering. As a core course in the Electrical Computer and Systems Engineering option of the Engineering Sciences concentration, it provides essential background and basic preparation for more advanced work in device physics, microwave and ultra-fast circuitry, antenna design, optics, optical communication and optoelectronics.

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

ECE501.1. Understand characteristics and wave propagation on high frequency transmission lines.

ECE501.2. Carryout impedance transformation on TL

ECE501.3. Use sections of transmission line sections for realizing circuit elements

ECE501.4. Characterize uniform plane wave

ECE501.5. Calculate reflection and transmission of waves at media interface.

ECE501.6. Analyze wave propagation on metallic waveguides in modal form.

ECE501.7. Understand principle of radiation and radiation characteristics of an antenna.

Programme Outcomes:

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern

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engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leaderin a team, to manage projects and in multidisciplinary environments

[PO.12]. **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

Programme Specific Outcomes:

PSO1. Professional Skills: An ability to apply the knowledge to understand, analyze and develop complex Engineering solutions in the field of Electronic Devices, Electronics Networks, Analog and Digital circuits, and Telecommunication Communication networks.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in hardware and software project development using necessary hardware skills and open-ended programming environments to deliver a quality product in multidisciplinary domain.

PSO3. Successful career and Entrepreneurship: An ability to employ modern technology and software platforms in creating innovative career paths in Industry, as an Entrepreneur and a zest for higher studies.

PSO4.Research and Development: An ability to undertake research for the development of new ideas, technology and Engineering solutions for societal benefit.

A. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		

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	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a studentto 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%
Total			**100%**

Syllabus

Module I: Transmission Lines: (6 Hours)

Equations of Voltage and Current on TX line, Propagation constant and characteristic impedance, and reflection coefficient and VSWR, Impedance Transformation on Loss-less and Low loss Transmission line, Power transfer on TX line, Smith Chart, Admittance Smith Chart, Applications of transmission lines: Impedance Matching, use transmission line sections as circuit elements.

Module II: Maxwell's Equations: (6 Hours)

Basics of Vectors, Vector calculus, Basic laws of Electromagnetics, Maxwell's Equations, Boundary conditions at Media Interface.

Module III: Uniform Plane Wave: (6 Hours)

Uniform plane wave, Propagation of wave, Wave polarization, Poincare's Sphere, Wave propagation in conducting medium, phase and group velocity, Power flow and Poynting vector, Surface current and power loss in a conductor

Module IV: Plane Waves at a Media Interface: (6 Hours)

Plane wave in arbitrary direction, Reflection and refraction at dielectric interface, Total internal reflection, wave polarization at media interface, Reflection from a conducting boundary.

Wave propagation in parallel plane waveguide, Analysis of waveguide general approach, Rectangular waveguide, Modal propagation in rectangular waveguide, Surface currents on the waveguide walls, Field visualization, Attenuation in waveguide.

Module V: Radiation: (6 Hours)

Solution for potential function, Radiation from the Hertz dipole, Power radiated by hertz dipole, Radiation Parameters of antenna, receiving antenna, Monopole and Dipole antenna,
HVDC and HVAC Common faults in transmission lines. Skin Effect, Ferranti Effect and Corona

B. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

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

Suggested Text/Reference Books:

- R.K. Shevgaonkar, Electromagnetic Waves, Tata McGraw Hill India, 2005
- E.C. Jordan & K.G. Balmain, Electromagnetic waves & Radiating Systems, Prentice Hall, India
- Narayana Rao, N: Engineering Electromagnetics, 3rd ed., Prentice Hall, 1997.
- David Cheng, Electromagnetics, Prentice Hall

Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Equations of Voltage and Current on TX line, Propagation constant and characteristic impedance	Lecture	ECE501.1	Mid Term-1, Quiz & End Sem Exam
2	Reflection coefficient and VSWR	Lecture	ECE501.1	Mid Term-1, Quiz & End Sem Exam
3	Impedance Transformation on Loss-less and Low loss Transmission line	Lecture	ECE501.1	Mid Term-1, Quiz & End Sem Exam
4	Power transfer on TX line	Lecture	ECE501.1	Mid Term-1, Quiz & End Sem Exam
5	Smith Chart, Admittance Smith Chart	Lecture	ECE501.1	Mid Term-1, Quiz & End Sem Exam
6	Applications of transmission lines: Impedance	Lecture	ECE501.1	Mid Term-1, Quiz & End Sem Exam

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	Matching			
7	Use transmission line sections as circuit elements	Lecture	ECE501.1	Mid Term-1, Quiz & End Sem Exam
8	Use transmission line sections as circuit elements	Lecture	ECE501.1	Mid Term-1, Quiz & End Sem Exam
9	Basics of Vectors, Vector calculus	Lecture	ECE501.2	Mid Term-1, Quiz & End Sem Exam
10	Basics of Vectors, Vector calculus	Lecture	ECE501.2	Mid Term-1, Quiz & End Sem Exam
11	Basic laws of Electromagnetics	Lecture	ECE501.2	Mid Term-1, Quiz & End Sem Exam
12	Maxwell's Equations	Lecture	ECE501.2	Mid Term-1, Quiz & End Sem Exam
13	Maxwell's Equations	Lecture	ECE501.2	Mid Term-1, Quiz & End Sem Exam
14	Boundary conditions at Media Interface	Lecture	ECE501.2	Mid Term-1, Quiz & End Sem Exam
15	Boundary conditions at Media Interface.	Lecture	ECE501.2	Mid Term-1, Quiz & End Sem Exam
16	Uniform plane wave, Propagation of wave	Lecture	ECE501.3	Mid Term-1, Quiz & End Sem Exam
17	Wave polarization	Lecture	ECE501.3	Mid Term-1, Quiz & End Sem Exam
18	Poincare's Sphere, Wave propagati	Lecture	ECE501.3	Mid Term-1, Quiz & End Sem Exam

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	on in conductin g medium			
19	phase and group velocity, Power flow	Lecture	ECE501.3	Mid Term-1, Quiz & End Sem Exam
20	Poynting vector	Lecture	ECE501.3	Mid Term-1, Quiz & End Sem Exam
21	Surface current	Lecture	ECE501.3	Mid Term-2, Quiz & End Sem Exam
22	power loss in a conductor	Lecture	ECE501.3	Mid Term-2, Quiz & End Sem Exam
23	Plane wave in arbitrary direction, Reflection and refraction at dielectric interface	Lecture	ECE501.4	Mid Term-2, Quiz & End Sem Exam
24	Total internal reflection	Lecture	ECE501.4	Mid Term-2, Quiz & End Sem Exam
25	wave polarizatio n at media interface, Reflection from a conductin g boundary	Lecture	ECE501.4	Mid Term-2, Quiz & End Sem Exam
26	Wave propagati on in parallel plane waveguide ,	Lecture	ECE501.4	Mid Term-2, Quiz & End Sem Exam
27	Analysis of waveguide general approach	Lecture	ECE501.4	Mid Term-2, Quiz & End Sem Exam
28	Rectangul ar waveguide	Lecture	ECE501.4	Mid Term-2, Quiz & End Sem Exam

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29	Modal propagation in rectangular waveguide, Surface currents on the waveguide walls, Field visualization, Attenuation in waveguide	Lecture	ECE501.4	Mid Term-2, Quiz & End Sem Exam
30	Solution for potential function	Lecture	ECE501.5	Mid Term-2, Quiz & End Sem Exam
31	Radiation from the Hertz dipole	Lecture	ECE501.5	Mid Term-2, Quiz & End Sem Exam
32	Power radiated by hertz dipole	Lecture	ECE501.5	Mid Term-2, Quiz & End Sem Exam
33	Radiation Parameters of antenna	Lecture	ECE501.5	Mid Term-2, Quiz & End Sem Exam
34	receiving antenna, Monopole and Dipole antenna	Lecture	ECE501.5	Mid Term-2, Quiz & End Sem Exam
35	HVDC and HVAC Common faults in transmission lines	Lecture	ECE501.5	Mid Term-2, Quiz & End Sem Exam
36	Skin Effect, Ferranti Effect and Corona	Lecture	ECE501.5	Mid Term-2, Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
ECE501.1	Understand characteristics and wave propagation on high frequency transmission lines	3	3	1	3	1	-	-	-	2	-	2	1	**2**	**3**	**1**	**1**
ECE501.2	Carryout impedance transformation on TL	3	2	2	2	-	-	-	-	1	-	1	1	**1**	**2**	**1**	**1**
ECE501.3	Use sections of transmission line sections for realizing circuit elements	3	2	2	2	1	**1**	-	-	-	-	-	-	**1**	**1**	**2**	**1**
ECE501.4	Characterize uniform plane wave	3	3	2	3	1	-	-	-	-	-	-	1	**2**	**2**	**2**	**1**
ECE501.5	Calculate reflection and transmission of waves at media interface	2	2	1	2	1	**1**	-	-	-	-	2	1	**3**	**2**	**2**	**1**
ECE501.6	Analyze wave propagation on metallic waveguides in modal form	3	2	2	2	1	**1**	-	-	-	-	-	-	**2**	**2**	**1**	**2**
ECE501.7	Understand principle of radiation and radiation characteristics	3	3	2	2	1	**1**	**1**	-	1	**1**	1	1	**2**	**2**	**2**	**2**

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	of an antenna															

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering I MID-SEMESTER (SEM –V) 2022-23						
Class: B.Tech.(ECE) V Semester						
Subject Name: ECE 501 ELECTROMAGNETIC WAVES		Time: 2 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		
Student will be able to CO1: CO2:						

CO Map	Question No.	Question	Marks
CO1	Q.1-10	Multiple choice 10 questions	3
CO1	Q.11	What is Cartesian coordinate system, explain it.	3
	Q.12	What is the vector equation of surface area in cylindrical coordinate system?	3
CO2	Q.13	Write the Maxwell's equations from Gauss's law in integral form?	6
CO1	Q.14	Explain the electric potential?	3
CO1	Q.15	Why electric potential is constant inside the good conductor?	3
	Q.16	Explain the electric boundary conditions?	3
CO1	Q 17	Explain the spherical coordinate system?	6

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CO2	Q18	Write the Maxwell equations in static field?	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

ECE501							
ELECTROMAGNETIC WAVES							
Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U6G6
100	30	70	B+	7	3	3	21
100	30	70	B-	5	3	3	15
100	30	70	A-	8	3	3	24
100	30	70	A	9	3	3	27
100	30	70	A	9	3	3	27
100	30	70	A	9	3	3	27
100	30	70	B-	5	3	3	15
100	30	70	A	9	3	3	27
100	30	70	B+	7	3	3	21
Total No. of Students			FALSE	9			
Total No. of Students			>60% marks	5	55.55556		
Attainment Level					Level 1		

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
Course Handout
Course : ANTENNA AND PROPAGATION
Course Code : ECE 503, Crédits : 03, Session :2023-24(Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vivek Singh Kushwah

A. **Introduction:** The purpose of this course is to provide a thorough introduction to antenna systems with an in depth study of various types & performance parameters for antenna.

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

ECE503.1. Understand the properties and various types of antennas.
ECE503.2. Analyze the properties of different types of antennas and their design.
ECE503.3. Operate antenna design software tools and come up with the design of the antenna of required specifications

B. Programme Outcomes:

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and

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norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **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

C. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to apply the knowledge to understand, analyze and develop complex Engineering solutions in the field of Electronic Devices, Electronics Networks, Analog and Digital circuits, and Telecommunication Communication networks.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in hardware and software project development using necessary hardware skills and open-ended programming environments to deliver a quality product in multidisciplinary domain.

PSO3. Successful career and Entrepreneurship: An ability to employ modern technology and software platforms in creating innovative career paths in Industry, as an Entrepreneur and a zest for higher studies.

PSO4.Research and Development: An ability to undertake research for the development of new ideas, technology and Engineering solutions for societal benefit.

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 studentto 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	End Semester Examination	EE	70%

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Examination			
Total			**100%**

E. Syllabus

Module I:Fundamental Concepts

Physical concept of radiation, Radiation pattern, near-and far-field regions, reciprocity, directivity and gain, effective aperture, polarization, input impedance, efficiency, Friis transmission equation, radiation integrals and auxiliary potential functions.

Radiation from Wires and Loops- Infinitesimal dipole, finite-length dipole, linear elements near conductors, dipoles for mobile communication, small circular loop.

Module II: Aperture and Reflector Antennas

Huygens' principle, radiation from rectangular rand circular apertures, design considerations, Babinet's principle, Radiation from sectoral and pyramidal horns, design concepts, prime-focus parabolic reflector and Cassegrain antennas.

Broadband Antennas- Log-periodic and Yagi-Uda antennas, frequency independent antennas, broadcast antennas.

Micro strip Antennas- Basic characteristics of micro strip antennas, feeding methods, methods of analysis, design of rectangular and circular patch antennas.

Module III: Antenna Arrays

Analysis of uniformly spaced arrays with uniform and non-uniform excitation amplitudes, extension to planar arrays, synthesis of antenna arrays .

Module IV: Basic Concepts of Smart Antennas

Concept and benefits of smart antennas, fixed weight beam forming basics, Adaptive beam forming.

Module V: Wave Propagation

Modes of Propagation, Plane Earth Reflection, Space wave and Surface Wave, Reflection and refraction waves by the Ionosphere Tropospheric Wave. Ionosphere Wave Propagation in the Ionosphere, Virtual Height, MUF Critical frequency, Skip Distance, Duct Propagation, Space wave

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

F. Lecture Plan

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Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Physical concept of radiation, Radiation pattern	Lecture	ECE 503.1	Mid Term-1, Quiz & End Sem Exam
2	Near-and far-field regions	Lecture	ECE 503.1	Mid Term-1, Quiz & End Sem Exam
3	Reciprocity, directivity and gain	Lecture	ECE 503.1	Mid Term-1, Quiz & End Sem Exam
4	Effective aperture, polarization, input impedance	Lecture	ECE 503.1	Mid Term-1, Quiz & End Sem Exam
5	Efficiency, Friis transmission equation	Lecture	ECE 503.1	Mid Term-1, Quiz & End Sem Exam
6	Radiation integrals and auxiliary potential functions.	Lecture	ECE 503.1	Mid Term-1, Quiz & End Sem Exam
7	Infinitesimal dipole, finite-length dipole	Lecture	ECE 503.1	Mid Term-1, Quiz & End Sem Exam
8	linear elements near conductors,	Lecture	ECE 503.1	Mid Term-1, Quiz & End Sem Exam
9	Dipoles for mobile communication, small circular loop.	Lecture	ECE 503.1	Mid Term-1, Quiz & End Sem Exam
10	Huygens' principle, radiation from rectangular rand circular apertures, design considerations,	Lecture	ECE 503.2	Mid Term-1, Quiz & End Sem Exam
11	Babinet's principle, Radiation from sectoral and pyramidal horns,	Lecture	ECE 503.2	Mid Term-1, Quiz & End Sem Exam
12	Design concepts, prime-focus parabolic reflector and Cassegrain antennas.	Lecture	ECE 503.2	Mid Term-1, Quiz & End Sem Exam
13	Log-periodic and Yagi-Uda antennas.	Lecture	ECE 503.2	Mid Term-1, Quiz & End Sem Exam
14	Frequency independent antennas,	Lecture	ECE 503.2	Mid Term-1, Quiz & End Sem Exam
15	Broadcast antennas	Lecture	ECE 503.2	Mid Term-1, Quiz & End Sem Exam
16	Micro strip Antennas- Basic characteristics of micro strip antennas, feeding methods,	Lecture	ECE 503.2	Mid Term-1, Quiz & End Sem Exam
17	Methods of analysis, design	Lecture	ECE 503.2	Assignment, Quiz

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	of rectangular patch antennas.			& End Sem Exam
18	Methods of analysis, design of circular patch antennas.	Lecture	ECE 503.3	Assignment, Quiz & End Sem Exam
19	Analysis of uniformly spaced arrays with uniform excitation amplitudes,	Lecture	ECE 503.3	Assignment, Quiz & End Sem Exam
20	Analysis of uniformly spaced arrays with non-uniform excitation amplitudes,	Lecture	ECE 503.3	Assignment, Quiz & End Sem Exam
21	extension to planar arrays,	Lecture	ECE 503.3	Assignment, Quiz & End Sem Exam
22	synthesis of antenna arrays.	Lecture	ECE 503.3	Assignment, Quiz & End Sem Exam
23	Concept and benefits of smart antennas,	Lecture	ECE 503.3	Assignment, Quiz & End Sem Exam
24	fixed weight beam forming basics,	Lecture	ECE 503.3	Assignment, Quiz & End Sem Exam
25	Adaptive beam forming.	Lecture	ECE 503.3	Assignment, Quiz & End Sem Exam
26	Modes of Propagation,	Lecture	ECE 503.2	Assignment, Quiz & End Sem Exam
27	Plane Earth Reflection,	Lecture	ECE 503.2	Assignment, Quiz & End Sem Exam
28	Space wave	Lecture	ECE 503.2	Assignment, Quiz & End Sem Exam
29	Surface Wave,	Lecture	ECE 503.2	Assignment, Quiz & End Sem Exam
30	Reflection and refraction waves by the Ionosphere Tropospheric Wave.	Lecture	ECE 503.2	Assignment, Quiz & End Sem Exam
31	Ionosphere Wave Propagation in the Ionosphere,	Lecture	ECE 503.2	Assignment, Quiz & End Sem Exam
32	Virtual Height,	Lecture	ECE 503.2	Assignment, Quiz & End Sem Exam
33	MUF Critical frequency,	Lecture	ECE 503.2	Assignment, Quiz & End Sem Exam
34	Skip Distance,	Lecture	ECE 503.2	Assignment, Quiz & End Sem Exam
35	Duct Propagation,	Lecture	ECE 503.2	Assignment, Quiz & End Sem Exam
36	Space wave	Lecture	ECE 503.2	Assignment, Quiz & End Sem Exam

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

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CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
***ECE503*.1**.	Understand the properties and various types of antennas	3	3	3	2	-	-	-	-	2	1	-	2	**3**	**2**	**2**	**2**
ECE503.2.	Analyze the properties of different types of antennas and their design.	3	2	2	2	1	-	1	-	1	1	-	1	**3**	**2**	**2**	**2**
ECE503.3.	Operate antenna design software tools and come up with the design of the antenna of required specifications	3	3	2	3	2	1	1	-	1	1	2	1	**2**	**2**	**2**	**2**

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Sample Question Paper

Amity School of Engineering and Technology Department of Electronics & Communication Engineering I MID-SEMESTER (SEM –V) 2023-24						
Class: B.Tech.(ECE) V Semester						
Subject Name: ECE 503 Antenna and Propagation		Time: 1.30 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1	Q.2,3	Q.4	Q.2,5,6		

Student will be able to
CO1: Understand the properties and various types of antennas
CO2: Analyze the properties of different types of antennas and their design.

CO Map	Question No.	Question	Marks
CO1	Q.1	What is effective area of an antenna explain in detail.	3
CO1	Q.2a	What is the condition for an antenna to be frequency independent?	3
	Q.2b	Define radiation pattern of an antenna. sketch the principle radiation pattern of vertical and horizontal half wave dipole	3
CO1	Q.3	What is Aperture antenna? Explain rectangular and circular aperture antenna.	6
CO2	Q.4	Derive reciprocity theorem for antenna. Show that the transmitting and receiving patterns of an antenna are equal.	3
CO2	Q.5a	What is babinet's principle and explain how it gives rise to the concept of complementary antenna?	3
	Q.5b	Explain the construction and properties of log periodic antenna.	3
CO2	Q 6	What is YAGI antenna? What is the effect of adding more reflectors to the yagi antenna?	6

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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

ECE503							
ANTENNAS AND PROPAGATION							
Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U7G7
100	30	70	A	9	3	3	27
100	30	70	A-	8	3	3	24
100	30	70	A	9	3	3	27
100	30	70	A+	10	3	3	30
100	30	70	A	9	3	3	27
100	30	70	A	9	3	3	27
100	30	70	B+	7	3	3	21
100	30	70	A+	10	3	3	30
100	30	70	A	9	3	3	27
Total No. of Students			FALSE	9			
Total No. of Students			>60% marks	8	88.88889		
Attainment Level					Level 3		

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

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
Course Handout
Course : ELECTROMAGNETIC WAVES LAB
Course Code : ECE 521, Crédits : 01, Session :2023-24 (Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Shally Goyal

A. Introduction: This course helps students to understand practically the concept of Electromagnetic waves and Transmission lines used in various applications of Communication systems.
Hands-on experiments related to the course contents ECE501.

B. Course Outcomes: •At the end of this course students will demonstrate the ability to

ECE 521.1 Understand characteristics and wave propagation on high frequency transmission lines

ECE 521.2 Carryout impedance transformation on TL

ECE 521.3 Use sections of transmission line sections for realizing circuit elements.

ECE 521.4 Calculate reflection and transmission of waves at media interface

ECE 521.5 Analyze wave propagation on metallic waveguides in modal form

ECE 521.6 Understand principle of radiation and radiation characteristics of an antenna

C. Programme Outcomes:

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze

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complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modernengineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leaderin a team, to manage projects and in multidisciplinary environments

[PO.12]. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage inindependent and life-long learning in the broadest context of technological change

D. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to apply the knowledge to understand, analyze and develop complex Engineering solutions in the field of Electronic Devices, Electronics Networks, Analog and Digital circuits, and Telecommunication Communication networks.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in hardware and software project development using necessary hardware skills and open-ended programming environments to deliver a quality product in multidisciplinary domain.

PSO3. Successful career and Entrepreneurship: An ability to employ modern technology and software platforms in creating innovative career paths in Industry, as an Entrepreneur and a zest for higher studies.

PSO4.Research and Development: An ability to undertake research for the development of new ideas, technology and Engineering solutions for societal benefit.

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E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Lab Record	LR	10%
	Performance	P	10%
	Viva-Voce	V	5%
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%
Total			**100%**

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Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	To Study the Wave propagation in parallel plane waveguide	Practical	ECE 521.1	Mid Term-1, Assignment, PR, LR,VIVA
2	To Study the Maxwell Equation and Boundary Condition in EM Wave.	Practical	ECE 521.2	Mid Term-1, Assignment, PR, LR, VIVA
3	To Study the Waves generated at resonant locations.	Practical	ECE 521.3	Mid Term-1, Assignment, PR, LR, VIVA
4	To measure the Propagation constant and characteristic impedance of EM waves in Parallel Wire.	Practical	ECE 521.5	Mid Term-1, Assignment, PR, LR, VIVA
5	Verify the relationship between wavelength of an EM wave in air and inside a rectangular waveguide.	Practical	ECE 521.3	Mid Term-1, Assignment, PR, LR, VIVA
6	Measurement of unknown load impedance and VSWR Based on transmission lines.	Practical	ECE 521.6	Mid Term-1, Assignment, PR, LR, VIVA
7	Wireless Power Transfer Measure the variation in voltage w.r.t. distance between coils, angular orientation of coils, receiver capacitance, metal sheet location and input frequency (ac circuit). Check the DC-AC conversion circuit properly. Make sure to maintain input voltage of 4-5 V DC. Do not touch the MOSFETs during the experiment.	Practical	ECE 521.4	Mid Term-1, Assignment, PR, LR, VIVA
8	Antenna (2 turns) Make a printed antenna using FeCl3 and	Practical	ECE 521.6	Mid Term-1, Assignment, PR, LR, VIVA

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	tape on a substrate and then test it using a Network Analyzer.			
9	Computational Electromagnetic (5 turns) : Photonic Crystals and Wave scattering Simulation software : MPB and MEEP [works best with Ubuntu]	Practical	ECE 521.6	Mid Term-1, Assignment, PR, LR, VIVA

F. Syllabus

List of experiments:

1. To Study the Wave propagation in parallel plane waveguide. **(2 Hours)**
2. To Study the Maxwell Equation and Boundary Condition in EM Wave. **(2 Hours)**
3. To Study the Waves generated at resonant locations. **(2 Hours)**
4. To measure the Propagation constant and characteristic impedance of EM waves in Parallel Wire. **(2 Hours)**
5. Verify the relationship between wavelength of an EM wave in air and inside a rectangular waveguide. **(2 Hours)**
6. Measurement of unknown load impedance and VSWR Based on transmission lines. **(2 Hours)**
7. Wireless Power Transfer Measure the variation in voltage w.r.t. distance between coils, angular orientation of coils, receiver capacitance, metal sheet location and input frequency (ac circuit). Check the DC-AC conversion circuit properly. Make sure to maintain input voltage of 4-5 V DC. Do not touch the MOSFETs during the experiment. **(2 Hours)**
8. Antenna (2 turns) Make a printed antenna using FeCl3 and tape on a substrate and then test it using a Network Analyzer. Ref: Antenna Theory by C. Balanis (3Ed, pg : 816-831) **(2 Hours)**
9. Computational Electromagnetic (5 turns) : Photonic Crystals and Wave scattering Simulation software : MPB and MEEP [works best with Ubuntu] **(4 Hours)**

G. Examination Scheme:

	IA	EE

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Components	A	PR	LR	V	PR	V
Weightage (%)	5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

H. Lecture Plan

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
ECE 521.1	Understand characteristics and wave propagation on high frequency transmission lines	2	2	2	1	-	-	-	-	-	-	-	1	**2**	**2**	**2**	**3**
ECE 521.2	Carryout impedance transformation on TL	3	2	2	2	-	-	-	-	-	-	-	1	**2**	**2**	**2**	**3**
ECE 521.3	Use sections of transmission line sections for realizing circuit elements	3	3	2	3	-	-	-	-	-	-	-	1	**2**	**2**	**2**	**3**

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ECE 521.4	Calculate reflection and transmission of waves at media interface	2	2	2	1	-	-	-	-	-	-	-	2	**2**	**2**	**2**	**3**
ECE 521.5	Analyze wave propagation on metallic waveguides in modal form	3	2	2	2	1	-	-	-	-	-	-	1	**2**	**2**	**2**	**3**
ECE 521.6	Understand principle of radiation and radiation characteristics of an antenna	2	2	1	1	1	-	-	-	-	-	-	1	**2**	**2**	**2**	**3**

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering MID-SEMESTER (SEM –V) 2022-23						
Class: B.Tech.(ECE) V Semester						
Subject Name: ECE 521 ELECTROMAGNETIC WAVES LAB		Time: 2 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,	Q.1, 2	Q. 2	Q.2	Q.2	Q.2

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Student will be able to attain CO1 to 3			
CO Map	Question No.	Question	Marks
CO1-2	Q.1	Explain Maxwell Equation and Boundary Condition in EM Wave.	15
CO1-2	Q 2	Verify the relationship between wavelength of an EM wave in air and inside a rectangular waveguide.	15

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

ECE521							
ELECTROMAGNETIC WAVES LAB							
Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U11G11
100	30	70	A	9	1	1	9
100	30	70	A	9	1	1	9
100	30	70	A	9	1	1	9
100	30	70	A	9	1	1	9
100	30	70	A	9	1	1	9
100	30	70	A+	10	1	1	10
100	30	70	A	9	1	1	9
100	30	70	A+	10	1	1	10
100	30	70	A	9	1	1	9
Total No. of Students			FALSE	9			
Total No. of Students			>60% marks	9	100		
Attainment Level					Level 3		

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

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
Course Handout
Course : ANTENNA & PROPAGATION LAB
Course Code : ECE 523, Crédits : 01, Session :2023-24 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vivek Singh Kushwah

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A. **Introduction:** This course helps students to understand practically the concept of designing of various Antennas. In the course the students will learn Simulation software, HFSS, design different types of antenna, verify their parameters and fabricate one of these.

B. **Course Outcomes:** At the end of the course, students will demonstrate the ability to:

ECE 523.1 Design different Antennas using simulation software.

ECE 523.2 Analyze the properties of different types of antennas and their design.

ECE 523.3 Operate antenna design software tools and come up with the design of the antenna of required specifications.

C. **Programme Outcomes:**

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modernengineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

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[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leaderin a team, to manage projects and in multidisciplinary environments

[PO.12]. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage inindependent and life-long learning in the broadest context of technological change

D. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to apply the knowledge to understand, analyze and develop complex Engineering solutions in the field of Electronic Devices, Electronics Networks, Analog and Digital circuits, and Telecommunication Communication networks.
PSO2. Problem-solving skills: An ability to apply standard practices and strategies in hardware and software project development using necessary hardware skills and open-ended programming environments to deliver a quality product in multidisciplinary domain.
PSO3. Successful career and Entrepreneurship: An ability to employ modern technology and software platforms in creating innovative career paths in Industry, as an Entrepreneur and a zest for higher studies.
PSO4.Research and Development: An ability to undertake research for the development of new ideas, technology and Engineering solutions for societal benefit.
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E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Lab Record	LR	10%
	Performance	P	10%
	Viva-Voce	V	5%
Attendance	A minimum of 75% Attendance is required to be maintained by a studentto be	A	5%

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	qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

List of experiments: [Any 10]

1. Introduction to HFSS.
2. To study the parameters of Microstrip antenna.
3. To Design and implement Microstrip Square patch antenna on HFSS.
4. To Design and implement Microstrip circular antenna on HFSS.
5. To Design and implement Microstrip Rectangular antenna on HFSS.
6. To Design and implement Microstrip Ring antenna on HFSS.
7. To Design and implement Microstrip patch Array antenna on HFSS.
8. Study of fabrication process of patch antenna.
9. Fabrication of patch antenna.
10. Testing of patch antenna.

G. Examination Scheme:

	IA				EE	
Components	**A**	**PR**	**LR**	**V**	**PR**	**V**
Weightage (%)	5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

H. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction to HFSS.	Practical	ECE 523.3	Mid Term-1, Assignment, PR, LR,VIVA
2	To study the parameters of Microstrip antenna.	Practical	ECE 523.2	Mid Term-1, Assignment, PR, LR, VIVA
3	To Design and implement Microstrip Square patch antenna on HFSS.	Practical	ECE 523.1	Mid Term-1, Assignment, PR, LR, VIVA

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4	To Design and implement Microstrip circular antenna on HFSS.	Practical	ECE 523.1	Mid Term-1, Assignment, PR, LR, VIVA
5	To Design and implement Microstrip Rectangular antenna on HFSS.	Practical	ECE 523.1	Mid Term-1, Assignment, PR, LR, VIVA
6	To Design and implement Microstrip Ring antenna on HFSS.	Practical	ECE 523.1	Mid Term-1, Assignment, PR, LR, VIVA
7	To Design and implement Microstrip patch Array antenna on HFSS.	Practical	ECE 523.1	Mid Term-1, Assignment, PR, LR, VIVA
8	Study of fabrication process of patch antenna.	Practical	ECE 523.3	Mid Term-1, Assignment, PR, LR, VIVA
9	Fabrication of patch antenna.	Practical	ECE 523.3	Mid Term-1, Assignment, PR, LR, VIVA
10	Testing of patch antenna.	Practical	ECE 523.2	Mid Term-1, Assignment, PR, LR, VIVA

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
ECE 523.1	Design different Antennas using simulation software.	2	1	2	2	-	-	-	-	-	-	1	1	**2**	**2**	**2**	**3**
ECE 523.2	Analyze the properties of different types of	3	2	2	1	1	-	-	-	-	-	1	1	**2**	**2**	**2**	**3**

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	antennas and their design.																
ECE 523.3	Operate antenna design software tools and come up with the design of the antenna of required specifications.	2	2	2	2	1	1	1	-	1	-	1	1	**2**	**2**	**2**	**3**

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering MID-SEMESTER (SEM –V) 2023-24						
Class: B.Tech.(ECE) V Semester						
Subject Name: ECE 523 Antenna and Propagation		Time: 2 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping		Q.1, 2	Q.1, 2	Q.1, 2	Q.1, 2	Q.1, 2
Student will be able to attain CO1 to 3						

CO Map	Question No.	Question	Marks
CO1-3	Q.1	To study the parameters of Microstrip antenna.	15
CO1-3	Q 2	To Design and implement Microstrip Rectangular antenna for fr4 on HFSS. Dielectric constant is 4.4 and height is 1.6mm	15

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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

ECE523							
ANTENNAS AND PROPAGATION LAB							
Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U10G10
100	30	70	A	9	1	1	9
100	30	70	A	9	1	1	9
100	30	70	A+	10	1	1	10
100	30	70	A+	10	1	1	10
100	30	70	A	9	1	1	9
100	30	70	A+	10	1	1	10
100	30	70	A	9	1	1	9
100	30	70	A+	10	1	1	10
100	30	70	A	9	1	1	9
Total No. of Students			FALSE	9			
Total No. of Students			>60% marks	9	100		
Attainment Level					Level 3		

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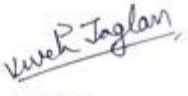

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Established vide Government of Madhya Pradesh Act No. 27 of 2010

Course Handout

Course : Computer Architecture

Course Code : ECE 601, Crédits : 03, Session :2023-24(Even Sem.), Class : B.Tech. 3rd Year

Faculty Name : Dr. Ajay Kumar Dadoria

D. Introduction: This course aims to provide a strong foundation for students to understand modern computer system architecture and to apply these insights and principles to future computer designs. The course is structured around the three primary building blocks of general-purpose computing systems: processors, memories, and networks.

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

ECE 601.1. The ability to learn how computers work know basic principles of computer's working.

ECE 601.2. Analyze the performance of computers.

ECE 601.3. Know how computers are designed and built.

ECE 601.4. Understand issues affecting modern processors (caches, pipelines etc.).

F. Programme Outcomes:

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural,

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societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modernengineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leaderin a team, to manage projects and in multidisciplinary environments

[PO.12]. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage inindependent and life-long learning in the broadest context of technological change

G. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to apply the knowledge to understand, analyze and develop complex Engineering solutions in the field of Electronic Devices, Electronics Networks, Analog and Digital circuits, and Telecommunication Communication networks.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in hardware and software project development using necessary hardware skills and open-ended programming environments to deliver a quality product in multidisciplinary domain.

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PSO3. Successful career and Entrepreneurship: An ability to employ modern technology and software platforms in creating innovative career paths in Industry, as an Entrepreneur and a zest for higher studies.

PSO4.Research and Development: An ability to undertake research for the development of new ideas, technology and Engineering solutions for societal benefit.

H. 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 studentto 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%
Total			**100%**

I. Syllabus

Module 1: Introduction to basic structure of computers: (7 Hours)

Basic Structure of Computers, Functional units, software, performance issues software, machine instructions

and programs, Types of instructions, Instruction sets: Instruction formats, Assembly language, Stacks, Ques,

Subroutines.

Module II: Processor Organization: (5 Hours)

Processor organization, Information representation, number formats. Multiplication & division, ALU design,

Floating Point arithmetic, IEEE 754 floating point formats.

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Module III: Control Design: (5 Hours)

Control Design, Instruction sequencing, Interpretation, Hard wired control - Design methods, and CPU control
unit. Microprogrammed Control - Basic concepts, minimizing microinstruction size, multiplier control unit.
Microprogrammed computers - CPU control unit

Module IV: Memory Classification: (7 Hours)

Memory organization, device characteristics, RAM, ROM, Memory management, Concept of Cache &
associative memories, Virtual memory.

Module V: Basics of parallel processing: (6 Hours)

System organization, Input - Output systems, Interrupt, DMA, Standard I/O interfaces Concept of parallel
processing, Pipelining, Forms of parallel processing, interconnect network.

J. 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

K. Suggested Text/Reference Books:

- V.Carl Hammacher, “Computer Organisation”, Fifth Edition.
- A.S.Tanenbum, “Structured Computer Organisation”, PHI, Third edition
- Y.Chu, "Computer Organization and Microprogramming” , II, Englewood Chiffs, N.J., Prentice Hall
  Edition
- M.M.Mano, “Computer System Architecture”, Edition
- C.W.Gear, “ Computer Organization and Programming”, McGraw Hill, N.V. Edition
  Hayes J.P, “Computer Architecture and Organization”, PHI, Second edition..

L. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Basic Structure of	Lecture	ECE	Mid Term-1,

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	Computers, Functional units		601.1	Quiz & End Sem Exam
2	Software, performance issues software	Lecture	ECE 601.1	Mid Term-1, Quiz & End Sem Exam
3	Machine instructions and programs	Lecture	ECE 601.1	Mid Term-1, Quiz & End Sem Exam
4	Types of instructions, Instruction sets	Lecture	ECE 601.1	Mid Term-1, Quiz & End Sem Exam
5	Instruction formats, Assembly language	Lecture	ECE 601.1	Mid Term-1, Quiz & End Sem Exam
6	Instruction formats, Assembly language	Lecture	ECE 601.1	Mid Term-1, Quiz & End Sem Exam
7	Stacks, Ques, Subroutines.	Lecture	ECE 601.1	Mid Term-1, Quiz & End Sem Exam
8	Processor organization	Lecture	ECE 601.2	Mid Term-1, Quiz & End Sem Exam
9	Information representation, number formats	Lecture	ECE 601.2	Mid Term-1, Quiz & End Sem Exam
10	Multiplication & division	Lecture	ECE 601.2	Mid Term-1, Quiz & End Sem Exam
11	ALU design, Floating Point arithmetic	Lecture	ECE 601.2	Mid Term-1, Quiz & End Sem Exam
12	ALU design, Floating Point arithmetic	Lecture	ECE 601.2	Mid Term-1, Quiz & End Sem Exam
13	IEEE 754 floating point formats	Lecture	ECE 601.2	Mid Term-1, Quiz & End Sem Exam
14	IEEE 754 floating point formats	Lecture	ECE 601.2	Mid Term-1, Quiz & End Sem Exam
15	Control Design, Instruction sequencing	Lecture	ECE 602.3	Mid Term-1, Quiz & End Sem Exam
16	Interpretation, Hard wired control - Design	Lecture	ECE 601.3	Mid Term-1, Quiz & End Sem

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	methods			Exam
17	CPU control unit. Microprogrammed Control - Basic concepts	Lecture	ECE 601.3	Mid Term-1, Quiz & End Sem Exam
18	CPU control unit. Microprogrammed Control - Basic concepts	Lecture	ECE 601.3	Mid Term-1, Quiz & End Sem Exam
19	Minimizing microinstruction size	Lecture	ECE 601.3	Mid Term-1, Quiz & End Sem Exam
20	Multiplier control unit	Lecture	ECE 601.3	Mid Term-1, Quiz & End Sem Exam
21	Microprogrammed computers - CPU control unit	Lecture	ECE 601.3	Mid Term-2, Quiz & End Sem Exam
22	Microprogrammed computers - CPU control unit	Lecture	ECE 601.3	Mid Term-2, Quiz & End Sem Exam
23	Memory organization	Lecture	ECE 601.4	Mid Term-2, Quiz & End Sem Exam
24	Device characteristics	Lecture	ECE 601.4	Mid Term-2, Quiz & End Sem Exam
25	RAM, ROM	Lecture	ECE 601.4	Mid Term-2, Quiz & End Sem Exam
26	Memory management	Lecture	ECE 601.4	Mid Term-2, Quiz & End Sem Exam
27	Concept of Cache & associative memories	Lecture	ECE 601.4	Mid Term-2, Quiz & End Sem Exam
28	Concept of Cache & associative memories	Lecture	ECE 601.4	Mid Term-2, Quiz & End Sem Exam
29	Virtual memory	Lecture	ECE 601.4	Mid Term-2, Quiz & End Sem Exam
30	System organization, Input - Output systems	Lecture	ECE 601.4	Mid Term-2, Quiz & End Sem Exam
31	Interrupt, DMA	Lecture	ECE 601.5	Mid Term-2, Quiz & End Sem Exam

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32	Standard I/O interfaces Concept of parallel processing	Lecture	ECE 601.5	Mid Term-2, Quiz & End Sem Exam
33	Standard I/O interfaces Concept of parallel processing	Lecture	ECE 601.5	Mid Term-2, Quiz & End Sem Exam
34	Pipelining, Forms of parallel processing	Lecture	ECE 601.5	Mid Term-2, Quiz & End Sem Exam
35	Pipelining, Forms of parallel processing	Lecture	ECE 601.5	Mid Term-2, Quiz & End Sem Exam
36	Interconnect network	Lecture	ECE 601.5	Mid Term-2, Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
ECE601.1	The ability to learn how computers work know basic principles of computer's working	3	3	1	3	1				2		2	1				
ECE602.2	Analyze the performance of computers	3	2	2	2	2				2		1	1				
ECE601.3	know how computers are designed and built	3	2	2	2	2				3		3	1				

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ECE601.4	Understand issues affecting modern processors (caches, pipelines etc.)	3	3	2	3	2				1		2	1			

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering I MID-SEMESTER (SEM –VI) 2023-24						
Class: B.Tech.(ECE) VI Semester						
Subject Name: ECE 601 Computer Architecture		Time: 1.5 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		

Student will be able to
CO1: The ability to learn how computers work know basic principles of computer's working.
CO2: Analyze the performance of computers.
CO:3 Know how computers are designed and built.
CO:4 Understand issues affecting modern processors (caches, pipelines etc.).

CO Map	Question No.	Question	Marks
CO1	Q.1	Compare and contrast between the Von Neumann and Harvard computer architectures	3
CO2	Q.2a	What is a register? Mention various types of registers and explain any two of them	3
	Q.2b	What are buses? Discuss bus arbitration scheme	3
CO2	Q.3	Write all kinds of shift micro-operations.	6
CO3	Q.4	Write about General Register Organisation.	3
CO4	Q.5a	Write Short note on Stack Organisation. How are stack pointers used	3

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	Q.5b	Explain various cache mapping techniques.	3
CO4	Q 6	Expound Bus arbitration techniques	6

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

ECE601							
COMPUTER ARCHITECTURE							
Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U6G6
100	30	70	A-	8	3	3	24
100	30	70	B+	7	3	3	21
100	30	70	B+	7	3	3	21
100	30	70	A-	8	3	3	24
100	30	70	B+	7	3	3	21
100	30	70	B+	7	3	3	21
100	30	70	B-	5	3	3	15
100	30	70	B	6	3	3	18
100	30	70	B+	7	3	3	21
Total No. of Students			FALSE	9			
Total No. of Students			>60% marks	2	22.22		
Attainment Level					Level 1		

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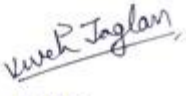

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AMITY UNIVERSITY

MADHYA PRADESH

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

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
Course Handout
Course : MICROWAVE THEORY AND TECHNIQUES LAB
Course Code : ECE 625, Credits : 01, Session :2023-24(Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Prof. (Dr.) Vivek Singh Kushwah

A. **Introduction:** This course deals with the microwaves. Microwaves are important when we are going to the high frequency regime. By studying this course students will be able to know about the microwave components and devices, microwave generators and their characteristics, microwave applications and measurement. Also, they will be familiar about the rectangular and circular waveguides, their equations and the modes existing in these waveguides.

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

ECE 625.1. Demonstrate the characteristics of Microwave sources.

ECE 625.2. Demonstrate the characteristics of directional Couplers.

ECE 625.3. To test the characteristics of microwave components.

ECE 625.4. To analyze the radiation pattern of antenna.

ECE 625.5. To measure antenna gain Practice microwave measurement procedures.

C. **Programme Outcomes:**

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural,

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societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modernengineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leaderin a team, to manage projects and in multidisciplinary environments

[PO.12]. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage inindependent and life-long learning in the broadest context of technological change

D. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to apply the knowledge to understand, analyze and develop complex Engineering solutions in the field of Electronic Devices, Electronics Networks, Analog and Digital circuits, and Telecommunication Communication networks.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in hardware and software project development using necessary hardware skills and open-ended programming environments to deliver a quality product in multidisciplinary domain.

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PSO3. Successful career and Entrepreneurship: An ability to employ modern technology and software platforms in creating innovative career paths in Industry, as an Entrepreneur and a zest for higher studies.

PSO4.Research and Development: An ability to undertake research for the development of new ideas, technology and Engineering solutions for societal benefit.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term Viva	CT	15%
	Mid Term Performance		
	Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a studentto 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 Practical Examination	EE	70%
Total			**100%**

F. Course Contents:

1. To study the characteristics of reflex klystron. (2 Hours)
2. To study the characteristic of Gunn diode. (2 Hours)
3. To measure frequency and guided wavelength of a microwave signal. (2 Hours)
4. To measure the impedance of a given load. (2 Hours)
5. To measure the dielectric constant of the given sample. (2 Hours)
6. To measure various parameters of a directional coupler. (2 Hours)
7. To study the characteristic and functions of an isolator. (2 Hours)
8. To study the characteristic and functions of a circulator. (3 Hours)
9. To study the characteristic and functions of various tees. (3 Hours)

	IA				EE	
Components	**A**	**PR**	**LR**	**V**	**PR**	**V**
Weightage (%)	5	10	10	5	35	35

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Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

G. Experiment Plan

Experiment	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	To study the characteristics of reflex klystron.	Practical	ECE 625.1	Mid Term Viva-1, Quiz & End Sem Pect. Exam
2	To study the characteristic of Gunn diode.	Practical	ECE 625.1	Mid Term Viva-1, Quiz & End Sem Pect. Exam
3	To measure frequency and guided wavelength of a microwave signal.	Practical	ECE 625.5	Mid Term Viva-1, Quiz & End Sem Pect. Exam
4	To measure the impedance of a given load.	Practical	ECE 625.3	Mid Term Viva-1, Quiz & End Sem Pect. Exam
5	To measure the dielectric constant of the given sample.	Practical	ECE 625.4	Mid Term Viva-2, Quiz & End Sem Pect. Exam
6	To measure various parameters of a directional coupler.	Practical	ECE 625.2	Mid Term Viva-2, Quiz & End Sem Pect. Exam
7	To study the characteristic and functions of an isolator.	Practical	ECE 625.3	Mid Term Viva-2, Quiz & End Sem Pect. Exam
8	To study the characteristic and functions of a circulator.	Practical	ECE 625.3	Mid Term Viva-2, Quiz & End Sem Pect. Exam
9	To study the characteristic and functions of various tees.	Practical	ECE 625.3	Mid Term Viva-3, Quiz & End Sem Pect. Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO11	PO11	PSO	PSO	PSO	PSO

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											0	1	2	1	2	3	4
ECE625.1	Demonstrate the characteristics of Microwave sources	3	3	1	3	1				2		2	1		2	1	
ECE625.2	Demonstrate the characteristics of directional Couplers	3	2	2	2	2				2		1	1		2	1	
ECE625.3	To test the characteristics of microwave components	3	2	2	2	2				2		1	1		2	1	
ECE625.4	To analyze the radiation pattern of antenna	3	2	2	2	2				2		1	1		2	1	
ECE625.5	To measure antenna-gain Practice microwave measurement procedures	3	2	2	2	2				2		1	1		2	1	

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering I MID-SEMESTER Viva (SEM –VI) 2023-24						
Class: B.Tech.(ECE) VI Semester						
Subject Name: ECE 625 MICROWAVE THEORY AND TECHNIQUES LAB		Time: 2 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

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Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to
CO1: Demonstrate the characteristics of Microwave sources.
CO2: Demonstrate the characteristics of directional Couplers.
CO3: To test the characteristics of microwave components.
CO4: To analyze the radiation pattern of antenna.
CO5: To measure antenna gain Practice microwave measurement procedure.

CO Map	Question No.	Question	Marks
CO1	Q.1	Explain the characteristics of reflex klystron.	2
CO1	Q.2a	Explain the characteristic of Gunn diode.	2
	Q.2b	How can We measure frequency and guided wavelength of a microwave signal?	3
CO1	Q.3	How can We measure the impedance of a given load?	3
CO2	Q.4	How can We measure the dielectric constant of the given sample?	3
CO2	Q.5a	How can We measure various parameters of a directional coupler?	3
	Q.5b	Explain Working of the characteristic and functions of an isolator.	3
CO3	Q.6	Different Types of the characteristic and functions of a circulator.	3
CO3	Q.7a	Explain the characteristic and functions of various tees.	3
CO4	Q.7b	Explain the radiation pattern of antenna.	3
CO5	Q.8	Explain measurement of antenna gain with example.	2

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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ECE625							
MICROWAVE THEORY AND TECHNIQUES LAB							
Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U14G14
100	30	70	A+	10	1	1	10
100	30	70	A	9	1	1	9
100	30	70	A+	10	1	1	10
100	30	70	A+	10	1	1	10
100	30	70	A+	10	1	1	10
100	30	70	A+	10	1	1	10
100	30	70	A+	10	1	1	10
100	30	70	A	9	1	1	9
100	30	70	A+	10	1	1	10
	Total No. of Students			FALSE	9		
	Total No. of Students			>60% marks	0	0	
	Attainment Level					Level 1	

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AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
Course Handout
Course : FIBER OPTIC COMMUNICATION
Course Code : ECE701, Crédits : 03, Session :2023-24(Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr Raghavendra Sharma

A. Introduction: This course provide in-depth knowledge of modern optical communication systems, Optical Sources, Different types of fibers, optical switching and the losses which occur during transmission of the signals

B. Course Outcomes: At the end of the course, students will demonstrate the ability to:

ECE701.1. Understand the principles fiber-optic communication, the components and the bandwidth advantages.
ECE701.2. Understand the properties of the optical fibers and optical components.
ECE701.3. Understand operation of lasers, LEDs, and detectors.
ECE701.4. Analyze system performance of optical communication systems
ECE701.5. Design optical networks and understand non-linear effects in optical fibers

C. Programme Outcomes:

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for

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sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **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

D. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to apply the knowledge to understand, analyze and develop complex Engineering solutions in the field of Electronic Devices, Electronics Networks, Analog and Digital circuits, and Telecommunication Communication networks.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in hardware and software project development using necessary hardware skills and open-ended programming environments to deliver a quality product in multidisciplinary domain.

PSO3. Successful career and Entrepreneurship: An ability to employ modern technology and software platforms in creating innovative career paths in Industry, as an Entrepreneur and a zest for higher studies.

PSO4.Research and Development: An ability to undertake research for the development of new ideas, technology and Engineering solutions for societal benefit.

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	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a studentto 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	End Semester Examination	EE	70%

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Examination			
Total			**100%**

F. Syllabus

Module1: Introduction to optical Fiber: (6 Hours)

Introduction to vector nature of light, propagation of light, propagation of light in a cylindrical dielectric rod, Ray model, wave model.

Different types of optical fibers, Modal analysis of a step index fiber. Signal degradation on optical fiber due to dispersion and attenuation. Fabrication of fibers and measurement techniques like OTDR.

Module II: Optical Sources: (7 Hours)

Optical sources - LEDs and Lasers, Photo-detectors - pin-diodes, APDs, detector responsivity, noise, optical receivers. Optical link design - BER calculation, quantum limit, power penalties.

Module III: Different Types of optical Switches: (6 Hours)

Optical switches - coupled mode analysis of directional couplers, electro-optic switches. Optical amplifiers - EDFA, Raman amplifier, WDM and DWDM systems. Principles of WDM networks.

Nonlinear effects in fiber optic links. Concept of self-phase modulation, group velocity dispersion and solition based communication.

Module IV: Mechanical properties of Fiber: (6 Hours)

Fiber end preparation, fiber splicing, fiber connectors, connection losses, fiber couplers, fiber materials, fiber fabrication, mechanical properties of fibers, different fiber cables.

Module V: Communication Components of Fiber: (5 Hours)

Basic communication components, coupling to and from the fiber, multiplexing and coding, repeaters, bandwidth and rise time budgets, noise, bit error rate and eye pattern.

G. 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

H. Suggested Text/Reference Books:

- J. Keiser, Fibre Optic communication, McGraw-Hill, 5th Ed. 2013 (Indian Edition).
- T. Tamir, Integrated optics, (Topics in Applied Physics Vol.7), Springer-Verlag, 1975.
- J. Gowar, Optical communication systems, Prentice Hall India, 1987.
- S.E. Miller and A.G. Chynoweth, eds., Optical fibres telecommunications, Academic Press, 1979.
- G. Agrawal, Nonlinear fibre optics, Academic Press, 2nd Ed. 1994.
- G. Agrawal, Fiber optic Communication Systems, John Wiley and sons, New York, 1997
- F.C. Allard, Fiber Optics Handbook for engineers and scientists, McGraw Hill, New York (1990).

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I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction to vector nature of light, propagation of light	Lecture	ECE701.1	Mid Term-1, Quiz & End Sem Exam
2	Propagation of light in a cylindrical dielectric rod	Lecture	ECE701.1	Mid Term-1, Quiz & End Sem Exam
3	Ray model, wave model	Lecture	ECE701.1	Mid Term-1, Quiz & End Sem Exam
4	Different types of optical fibers	Lecture	ECE701.2	Mid Term-1, Quiz & End Sem Exam
5	Modal analysis of a step index fiber	Lecture	ECE701.2	Mid Term-1, Quiz & End Sem Exam
6	Signal degradation on optical fiber due to dispersion and attenuation	Lecture	ECE701.2	Mid Term-1, Quiz & End Sem Exam
7	Fabrication of fibers and measurement techniques like OTDR	Lecture	ECE701.2	Mid Term-1, Quiz & End Sem Exam
8	Optical sources - LEDs	Lecture	ECE707.1	Mid Term-1, Quiz & End Sem Exam
9	Optical sources - Lasers	Lecture	ECE701.3	Mid Term-1, Quiz & End Sem Exam
10	Photo-detectors, pin-diodes	Lecture	ECE701.3	Mid Term-1, Quiz & End Sem Exam
11	APDs	Lecture	ECE701.3	Mid Term-1, Quiz & End Sem Exam
12	Detector responsivity, noise	Lecture	ECE701.3	Mid Term-1, Quiz & End Sem Exam
13	Detector noise	Lecture	ECE701.3	Mid Term-1, Quiz & End Sem Exam
14	Optical receivers. Optical link design - BER calculation	Lecture	ECE701.3	Mid Term-1, Quiz & End Sem Exam
15	Quantum limit, power penalties	Lecture	ECE701.3	Assignment & End Sem Exam
16	Optical switches	Lecture	ECE701.3	Assignment & End Sem Exam
17	Coupled mode analysis of directional couplers	Lecture	ECE701.3	Assignment & End Sem Exam
18	Electro-optic switches	Lecture	ECE701.3	Assignment & End Sem Exam
19	Optical amplifiers - EDFA	Lecture	ECE701.3	Assignment & End Sem Exam
20	Raman amplifier	Lecture	ECE701.3	Assignment & End Sem Exam

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21	WDM and DWDM systems.	Lecture	ECE701.4	Assignment & End Sem Exam
22	Principles of WDM networks	Lecture	ECE701.4	Assignment & End Sem Exam
23	Nonlinear effects in fiber optic links	Lecture	ECE701.4	Assignment & End Sem Exam
24	Concept of self-phase modulation, group velocity dispersion and solition based communication	Lecture	ECE701.4	Assignment & End Sem Exam
25	Fiber end preparation, fiber splicing	Lecture	ECE701.4	Assignment & End Sem Exam
26	Fiber splicing, fiber connectors, connection losses	Lecture	ECE701.4	Quiz & End Sem Exam
27	Fiber couplers, fiber materials	Lecture	ECE701.4	Quiz & End Sem Exam
28	fiber fabrication	Lecture	ECE701.4	Quiz & End Sem Exam
29	mechanical properties of fibers	Lecture	ECE701.4	Quiz & End Sem Exam
30	different fiber cables	Lecture	ECE701.4	Quiz & End Sem Exam
31	Basic communication components	Lecture	ECE701.5	Quiz & End Sem Exam
32	coupling to and from the fiber	Lecture	ECE701.5	Quiz & End Sem Exam
33	multiplexing and coding, repeaters	Lecture	ECE701.5	Quiz & End Sem Exam
34	bandwidth and rise time budgets	Lecture	ECE701.5	Quiz & End Sem Exam
35	noise, bit error rate and eye pattern	Quiz	ECE701.5	-
36	Test	Revision	ECE701.1	-

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4

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ECE701.1.	Understand the principles fiber-optic communicatio n, the components and the bandwidth advantages.	3	1	**3**	1	-	**-**	**-**	**-**	1	**-**	**3**	**1**	**3**	**1**	**2**	**3**
ECE701.2	Understand the properties of the optical fibers and optical components.	3	**3**	3	2	-	**-**	**2**	**-**	-	**3**	1	**2**	**3**	**1**	**3**	**3**
ECE701.3	Understand operation of lasers, LEDs, and detectors	3	3	2	**3**	-	**-**	**1**	**-**	-	**2**	**2**	3	**3**	**3**	**3**	**2**
ECE701.4	Analyze system performance of optical communication systems	3	3	3	-	1	**-**	**-**	**-**	2	**3**	3	2	**3**	**3**	**1**	**3**
ECE701.5	Design optical networks and understand non-linear effects in optical fibers	3	2	3	-	1	**-**	**-**	**-**	1	**2**	2	1	**2**	**2**	**1**	**3**

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Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering I MID-SEMESTER (SEM –VII) 2023-24						
Class: B.Tech.(ECE) VII Semester						
Subject Name: ECE 701 Fiber Optic Communication		Time: 1.5 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1-10,13,16	Q.11,12	Q.14	Q.15,18		Q.17

Student will be able to
CO1: Understand the principles fiber-optic communication, the components and the bandwidth advantages.
CO2: Understand the properties of the optical fibers and optical components.

CO Map	Question No.	Question	Marks
CO1	Q.1-10	Multiple choice 10 questions	5
CO2	Q. 11	What do understand by the concept of total internal reflection? Explain with suitable diagram	3
	Q.12	What do you understand by scattering losses. Explain Rayleigh scattering losses in detail.	3
CO1	Q.13	Define the normalized frequency for an optical fiber & explain its use in the determination of the number of guided modes propagating in a graded index fiber.	3
CO2	Q.14	Define dispersion phenomenon in various index profiles of optical fibers. Which type of dispersion is prevalent in single mode fibers and why?	3
CO1	Q.15	Describe with the aid of simple ray diagram the concept of Graded step index fiber.	3
CO1	Q.16	Describe with the aid of suitable diagram the mechanism of Multimode step index fiber and derive the formula of number of guided modes.	5
CO2	Q.17	The threshold optical power for stimulated Brilloin scattering at a wavelength of 0.85 µm in a long single mode fiber using an injection laser source with a bandwidth of 800MHz is 127mW. The fiber has an attenuation of 2dB /Km at this wavelength. Determine the threshold optical power for stimulated	

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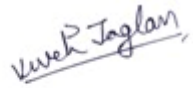
		Raman scattering using the fiber at a wavelength of 0.9 µm assuming fiber attenuation is reduced to 1.8dB/Km at this wavelength.	
CO2	Q.18	Discuss absorption loses in optical fiber comparing & contrasting the intrinsic and extrinsic absorption mechanism.	

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

ECE701							
FIBER OPTIC COMMUNICATION							
Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U1G1
100	30	70	A	9	3	3	27
100	30	70	C+	4	3	3	12
100	30	70	B-	5	3	3	15
100	30	70	C+	4	3	3	12
100	30	70	C+	4	3	3	12
100	30	70	C+	4	3	3	12
Total No. of Students			=	6			
Total No. of Students			>60% marks	1	16.66667		
Attainment Level					Level 1		



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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
Course Handout
Course : COMPUTER NETWORK
Course Code : ECE 702, Crédits : 03, Session :2023-234(Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Prof. (Dr.) Vivek Singh Kushwah

A. Introduction: This course is designed to provide a detailed treatment of Networking principles and control of switching systems, traffic engineering, Transport Layer and Network Layer and Link Layer protocols for telecommunication networks

B. Course Outcomes: At the end of the course, students will demonstrate the ability to:

ECE702.1. Understand the concepts of networking thoroughly.
ECE702.2. Design a network for a particular application.
ECE702.3. Analyze the performance of the network.
ECE702.4. To see the function of Transport and Network layer.

C. Programme Outcomes:

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

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[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **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

D. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to apply the knowledge to understand, analyze and develop complex Engineering solutions in the field of Electronic Devices, Electronics Networks, Analog and Digital circuits, and Telecommunication & Communication networks.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in hardware and software project development using necessary hardware skills and open-ended programming environments to deliver a quality product in multidisciplinary domain.

PSO3. Successful career and Entrepreneurship: An ability to employ modern technology and software platforms in creating innovative career paths in Industry, as an Entrepreneur and a zest for higher studies.

PSO4.Research and Development: An ability to undertake research for the development of new ideas, technology and Engineering solutions for societal benefit.

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	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a studentto 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%
Total			**100%**

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F. Syllabus

Module I: Introduction of Application Layer

Introduction to computer networks and the Internet: Application layer: Principles of network applications, The Web and Hyper Text Transfer Protocol, File transfer, Electronic mail, Domain name system, Peer-to-Peer file sharing, Socket programming, Layering concepts.

Module II: Switching in computer Network

Switching in networks: Classification and requirements of switches, a generic switch, Circuit Switching, Timedivision switching, Space-division switching, Crossbar switch and evaluation of blocking probability, 2-stage, 3-stage and n-stage networks, Packet switching, Blocking in packet switches, Three generations of packet switches, switch fabric, Buffering, Multicasting, Statistical Multiplexing.

Module III: Applications of Transport Layer

Transport layer: Connectionless transport - User Datagram Protocol, Connection-oriented transport – Transmission Control Protocol, Remote Procedure Call. Congestion Control and Resource Allocation: Issues in Resource Allocation, Queuing Disciplines, TCP congestion Control, Congestion Avoidance Mechanisms and Quality of Service.

Module IV: Applications Network Layer

Network layer: Virtual circuit and Datagram networks, Router, Internet Protocol, Routing algorithms, Broadcast and Multicast routing.

Module V: ALOHA & IEEE 802 Standards

Link layer: ALOHA, Multiple access protocols, IEEE 802 standards, Local Area Networks, addressing, Ethernet, Hubs, and Switches.

Module VI: Industrial Visit

One day visit to local industry in the field of Electronics Engineering

G. 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

H. Suggested Text/Reference Books:

• J.F. Kurose and K. W. Ross, “Computer Networking – A top down approach featuring the Internet”, Pearson Education, 5th Edition

• L. Peterson and B. Davie, “Computer Networks – A Systems Approach” Elsevier Morgan Kaufmann Publisher, 5th Edition.

• T. Viswanathan, “Telecommunication Switching System and Networks”, Prentice Hall

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• S. Keshav, “An Engineering Approach to Computer Networking” , Pearson Education

• B. A. Forouzan, “Data Communications and Networking”, Tata McGraw Hill, 4th Edition

• Andrew Tanenbaum, “Computer networks”, Prentice Hall

• D. Comer, “Computer Networks and Internet/TCP-IP”, Prentice Hall

• William Stallings, “Data and computer communications”, Prentice Hall

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction to computer networks and the Internet	Lecture	ECE702.1	Mid Term-1, Quiz & End Sem Exam
2	Application layer: Principles of network applications	Lecture	ECE702.1	Mid Term-1, Quiz & End Sem Exam
3	The Web and Hyper Text Transfer Protocol	Lecture	ECE702.1	Mid Term-1, Quiz & End Sem Exam
4	File transfer, Electronic mail	Lecture	ECE702.1	Mid Term-1, Quiz & End Sem Exam
5	Domain name system	Lecture	ECE702.1	Mid Term-1, Quiz & End Sem Exam
6	Peer-to-Peer file sharing	Lecture	ECE702.1	Mid Term-1, Quiz & End Sem Exam
7	Socket programming	Lecture	ECE702.1	Mid Term-1, Quiz & End Sem Exam
8	Layering concepts	Lecture	ECE702.1	Mid Term-1, Quiz & End Sem Exam
9	Switching in networks	Lecture	ECE702.2	Mid Term-1, Quiz & End Sem Exam
10	Classification and requirements of switches	Lecture	ECE702.2	Mid Term-1, Quiz & End Sem Exam
11	A generic switch, Circuit Switching	Lecture	ECE702.2	Mid Term-1, Quiz & End Sem Exam
12	Time-division switching, Space-division switching	Lecture	ECE702.2	Mid Term-1, Quiz & End Sem Exam
13	Crossbar switch and evaluation of blocking probability	Tutorial	ECE702.2	Mid Term-1, Quiz & End Sem Exam
14	2-stage, 3-stage and n-stage networks, Packet switching, Blocking in packet switches	Lecture	ECE702.2	Assignment & End Sem Exam
15	Three generations of packet switches, switch fabric, Buffering, Multicasting, Statistical Multiplexing	Lecture	ECE702.2	Assignment & End Sem Exam
16	Transport layer:	Lecture	ECE702.3	Assignment &

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	Connectionless transport			End Sem Exam
17	User Datagram Protocol	Lecture	ECE702.3	Assignment & End Sem Exam
18	Connection-oriented transport – Transmission Control Protocol, Remote Procedure Call	Lecture	ECE702.3	Assignment & End Sem Exam
19	Congestion Control and Resource Allocation: Issues in Resource Allocation	Lecture	ECE702.3	Assignment & End Sem Exam
20	Queuing Disciplines, TCP congestion Control	Lecture	ECE702.3	Assignment & End Sem Exam
21	Congestion Avoidance Mechanisms and Quality of Service	Lecture	ECE702.3	Assignment & End Sem Exam
22	Network layer	Lecture	ECE702.4	Assignment & End Sem Exam
23	Virtual circuit and Datagram networks	Lecture	ECE702.4	Assignment & End Sem Exam
24	Router, Internet Protocol	Assignment	ECE702.4	Assignment & End Sem Exam
25	Routing algorithms	Lecture	ECE702.4	Quiz & End Sem Exam
26	Broadcast routing	Lecture	ECE702.4	Quiz & End Sem Exam
27	Multicast routing	Lecture	ECE702.4	Quiz & End Sem Exam
28	Applications of Network Layer	Lecture	ECE702.4	Quiz & End Sem Exam
29	ALOHA & IEEE 802 Standards	Lecture	ECE702.5	Quiz & End Sem Exam
30	Link layer: ALOHA	Lecture	ECE702.5	Quiz & End Sem Exam
31	Multiple access protocols	Lecture	ECE702.5	Quiz & End Sem Exam
32	IEEE 802 standards	Lecture	ECE702.5	Quiz & End Sem Exam
33	Local Area Networks	Lecture	ECE702.5	Quiz & End Sem Exam
34	addressing	Lecture	ECE702.5	Quiz & End Sem Exam
35	Ethernet	Lecture	ECE702.5	Quiz & End Sem Exam
36	Hubs, Switches	Lecture	ECE702.5	Quiz & End Sem Exam

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

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CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO3
ECE702.1	Understand the concepts of networking thoroughly.	3	1	2	3	-	-	-	-	1		2	3	**3**	**1**	**2**	**3**
ECE702.2	Design a network for a particular application.	3	2	1	-	-	**1**	**1**	-	-	-	1	3	**3**	**3**	**2**	**3**
ECE702.3	Analyze the performance of the network.	3	3	1	-	1	-	-	-	3	**1**	3	3	**3**	**2**	**3**	**3**
ECE702.4	To see the function of Transport and Network layer.	3	3	1	-	1	-	-	-	3	**1**	3	3	**3**	**2**	**3**	**3**

Sample Question Paper

Amity School of Engineering and Technology Department of Computer Science and Engineering I MID-SEMESTER (SEM –VII) 2023-24						
Class: B.Tech.(ECE) VII Semester						
Subject Name: ECE 702 Computer Network		Time: 1.5 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1-10,13,16	Q.11,12	Q.14	Q.15,17		Q.18
Student will be able to CO1: Understand the concepts of networking thoroughly. CO2: Design a network for a particular application. CO3: Analyze the performance of the network. CO4: To see the function of Transport and Network layer.						
CO Map	Question No.	Question				Marks

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CO1-CO4	Q.1-10	Multiple choice 10 questions	5
CO2	Q. 11	Explain different types of transmission media.	3
	Q.12	Design a network for a particular application.	3
CO3	Q.13	Explain the UDP operation & also explain encapsulation & decapsulation process of UDP data.	3
CO1	Q.14	How are ISO and OSI related to each other?	3
CO4	Q.15	Differentiate between distance vector routing and Link state routing.	3
CO3	Q.16	What is different IEEE 802 standards? Explain briefly with all standards of IEEE.	5
CO1	Q.17	What is different data compression type? Explain briefly. Give at least one reason why PPP uses byte stuffing instead of bit stuffing to prevent accidental flag bytes within the payload from causing confusion.	5
CO2	Q.18	Explain the properties of coaxial cable and fiber optic cable with diagram. What are the advantages and disadvantages of optical fiber as a transmission medium? What factors affect the data rate of a link?	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

ECE702							
COMPUTER NETWORK							
Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U2G2
100	30	70	B+	7	3	3	21
100	30	70	B	6	3	3	18
100	30	70	B-	5	3	3	15
100	30	70	B+	7	3	3	21
100	30	70	C+	4	3	3	12
100	30	70	B-	5	3	3	15
Total No. of Students			=	6			
Total No. of Students			>60% marks	0	0		
Attainment Level					Level 1		

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MADHYA PRADESH

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

Course Handout
Course : CMOS Design
Course Code : ECE 704, Crédits : 03, Session :2023-24(Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Ajay Kumar Dadoria

A. Introduction: In the recent years, IC manufacturing technology has gone through dramatic evolution and changes, continuously scaling to ever smatter dimensions. This scaling has a double impact on the design of ICs. First, the complexity of the designs that can be put on a single die has increased dramatically which led to new design methodologies. At the same time, this plunge into deep submicron space causes devices to behave differently and brings challenging issues to forefront. This course along with the course of Digital Circuits and Systems II and Analog CMOS IC design will give you many of the basic essentials to work in the area of Circuit Design. Since this course takes the latest trends in the industry into account, you will find yourself at a definite edge.

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

ECE 704.1. Design different CMOS circuits using various logic families along with their circuit layout.

ECE 704.2. Use of tools for VLSI IC design.

C. Programme Outcomes:

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the

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professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **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

D. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to apply the knowledge to understand, analyze and develop complex Engineering solutions in the field of Electronic Devices, Electronics Networks, Analog and Digital circuits, and Telecommunication Communication networks.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in hardware and software project development using necessary hardware skills and open-ended programming environments to deliver a quality product in multidisciplinary domain.

PSO3. Successful career and Entrepreneurship: An ability to employ modern technology and software platforms in creating innovative career paths in Industry, as an Entrepreneur and a zest for higher studies.

PSO4.Research and Development: An ability to undertake research for the development of new ideas, technology and Engineering solutions for societal benefit.

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	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a studentto be qualified	A	5%

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	for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Introduction to VLSI design: (8 Hours)

VLSI Design Concepts, Moor's Law, Scale of Integration (SSI, MSI, LSI, VLSI, ULSI – basic idea only), Types of VLSI Chips (Analog & Digital VLSI chips, General purpose, ASIC, PLA, FPGA), Design principles (Digital VLSI – Concept of Regularity, Granularity etc), Design Domains (Behavioral, Structu1) ,Design hierarchy, VLSI Design style: Full custom, Gate array, standard-cell, Macro cell based design, Field programmable devices.

Module II: Basics of MOSFET: (8 Hours)

MOS transistor theory: MOS Capacitor(Accumulation, Depletion, Inversion) ,Fundamentals of Enhancement Mode MOSFETs, Depletion Mode MOSFETs, Weak & strong Inversion Conditions, Ideal Current-Voltage (IV) Characteristics of a MOSFET, non ideal I-V effects(Channel Length Modulation, Body effect, Sub threshold conduction, velocity saturation), Threshold Voltage Concept in MOSFETs and its physical significance ,Trends & Projections in VLSI Design & Technology, Scaling in MOS devices. MOS capacitances. Comparison of equations for PMOS and NMOS.

Module III: CMOS for Digital VLSI Circuits: (6 Hours)

General CMOS logic structure, VTC of an ideal inverter, noise margin, Different types of inverter (resistive load, and CMOS), DC transfer Characteristics of CMOS, Switching characteristic (propagation delay like High to low & low to high), Different types of Power dissipation in CMOS, power and delay trade-off, tri state inverter.

Module IV: Combinational circuit & sequential Circuit design: (4 Hours)

Series and parallel N and P switches, : Good 0 and Poor 0 transmission by Pass transistor logic, Implementation of NAND & NOR using CMOS, Design of complex logics by using CMOS, TGL, Pseudo NMOS logic design, Dynamic logic(Pre-charge & Evaluation),concept of charge sharing , Domino Logic, concept of Bi CMOS. Principle of Bi-stability, NAND and NOR based SR latch, and clocked SR Latch, JK latch

Module V: Integrated Circuit Layout: (4 Hours)

Introduction to CMOS Process technology, Latch up and its prevention, Stick Diagrams, Physical Design Rules, stick diagrams of CMOS NAND and NOR gates and stick diagrams for functions like (AB+E+CD)*. Design Rules, Parasitics. Delay: RC Delay model, linear delay model, logical path efforts. Power, interconnect and Robustness in CMOS circuit layout.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

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

H. Suggested Text/Reference Books:

- Jan M Rabaey: Digital Integrated Circuits
- David Hodges et al: Analysis and Design of Digital ICs
- Kang: CMOS Digital ICs
- Weste and Harris: CMOS VLSI design
- Weste and Eshragian: Principles of CMOS VLSI Design

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	VLSI Design Concepts, Moor's Law, Scale of Integration (SSI, MSI, LSI, VLSI, ULSI – basic idea only)	Lecture	ECE 704.1	Mid Term-1, Quiz & End Sem Exam
2	Types of VLSI Chips (Analog & Digital VLSI chips, General purpose, ASIC, PLA, FPGA)	Lecture	ECE 704.1	Mid Term-1, Quiz & End Sem Exam
3	Design principles (Digital VLSI –Concept of Regularity	Lecture	ECE 704.1	Mid Term-1, Quiz & End Sem Exam
4	Design Domains (Behavioral, Structu1)	Lecture	ECE 704.1	Mid Term-1, Quiz & End Sem Exam
5	Design hierarchy, VLSI Design style: Full custom	Lecture	ECE 704.1	Mid Term-1, Quiz & End Sem Exam
6	Gate array, standard-cell, Macro cell based design	Lecture	ECE 704.1	Mid Term-1, Quiz & End Sem Exam
7	Field programmable devices	Lecture	ECE 704.1	Mid Term-1, Quiz & End Sem Exam
8	MOS transistor theory: MOSCapacitor(Accumulation, Depletion, Inversion) , Fundamentals of Enhancement Mode MOSFETs	Lecture	ECE 704.2	Mid Term-1, Quiz & End Sem Exam
9	Depletion Mode MOSFETs, Weak & strong Inversion Conditions , Ideal Current-Voltage (IV) Characteristics of a MOSFET	Lecture	ECE 704.2	Mid Term-1, Quiz & End Sem Exam
10	Non ideal I-V	Lecture	ECE	Mid Term-1,

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	effects(Channel Length Modulation, Body effect, Sub threshold conduction, velocity saturation)		704.2	Quiz & End Sem Exam
11	Threshold Voltage Concept in MOSFETs and its physical significance	Lecture	ECE 704.2	Mid Term-1, Quiz & End Sem Exam
12	Threshold Voltage Concept in MOSFETs and its physical significance	Lecture	ECE 704.2	Mid Term-1, Quiz & End Sem Exam
13	Trends & Projections in VLSI Design & Technology	Lecture	ECE 704.2	Mid Term-1, Quiz & End Sem Exam
14	Scaling in MOS devices.MOS capacitances. Comparison of equations for PMOS and NMOS	Lecture	ECE 704.2	Mid Term-1, Quiz & End Sem Exam
15	Scaling in MOS devices.MOS capacitances. Comparison of equations for PMOS and NMOS	Lecture	ECE 704.2	Mid Term-1, Quiz & End Sem Exam
16	General CMOS logic structure, VTC of an ideal inverter, noise margin	Lecture	ECE 704.3	Mid Term-1, Quiz & End Sem Exam
17	Different types of inverter (resistive load, and CMOS)	Lecture	ECE 704.3	Mid Term-1, Quiz & End Sem Exam
18	DC transfer Characteristics of CMOS	Lecture	ECE 704.3	Mid Term-1, Quiz & End Sem Exam
19	Switching characteristic (propagation delay like High to low & low to high)	Lecture	ECE 704.3	Mid Term-1, Quiz & End Sem Exam
20	Different types of Power dissipation in CMOS	Lecture	ECE 704.3	Mid Term-1, Quiz & End Sem Exam
21	Power and delay trade-off, tri state inverter	Lecture	ECE 704.3	Mid Term-2, Quiz & End Sem Exam
22	Power and delay trade-off, tri state inverter	Lecture	ECE 704.3	Mid Term-2, Quiz & End Sem Exam
23	Series and parallel N and P switches, : Good 0 and Poor 0 transmission by Pass transistor logic	Lecture	ECE 704.4	Mid Term-2, Quiz & End Sem Exam
24	Implementation of NAND & NOR using CMOS, Design of complex logics	Lecture	ECE 704.4	Mid Term-2, Quiz & End Sem Exam

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	by using CMOS			
25	TGL, Pseudo NMOS logic design, Dynamic logic(Pre-charge & Evaluation)	Lecture	ECE 704.4	Mid Term-2, Quiz & End Sem Exam
26	Concept of charge sharing , Domino Logic, concept of Bi CMOS	Lecture	ECE 704.4	Mid Term-2, Quiz & End Sem Exam
27	Concept of charge sharing , Domino Logic, concept of Bi CMOS	Lecture	ECE 704.4	Mid Term-2, Quiz & End Sem Exam
28	Principle of Bi-stability, NAND and NOR based SR latch	Lecture	ECE 704.4	Mid Term-2, Quiz & End Sem Exam
29	Clocked SR Latch, JK latch	Lecture	ECE 704.4	Mid Term-2, Quiz & End Sem Exam
30	Introduction to CMOS Process technology, Latch up and its prevention	Lecture	ECE 704.5	Mid Term-2, Quiz & End Sem Exam
31	Stick Diagrams, Physical Design Rules, stick diagrams of CMOS NAND and NOR gates	Lecture	ECE 704.5	Mid Term-2, Quiz & End Sem Exam
32	stick diagrams for functions like (AB+E+CD)*	Lecture	ECE 704.5	Mid Term-2, Quiz & End Sem Exam
33	Design Rules, Parasitics. Delay: RC Delay model	Lecture	ECE 704.5	Mid Term-2, Quiz & End Sem Exam
34	Design Rules, Parasitics. Delay: RC Delay model	Lecture	ECE 704.5	Mid Term-2, Quiz & End Sem Exam
35	linear delay model, logical path efforts	Lecture	ECE 704.5	Mid Term-2, Quiz & End Sem Exam
36	Power, interconnect and Robustness in CMOS circuit layout	Lecture	ECE 704.5	Mid Term-2, Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES	CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES

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		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
ECE704.1	Design different CMOS circuits using various logic families along with their circuit layout.	3	3	1	3	1				2		2	1		1	2	
ECE704.2	Use of tools for VLSI IC design.	3	2	2	2	2				2		1	1		2	1	

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering I MID-SEMESTER (SEM –VII) 2023-24						
Class: B.Tech.(ECE) VII Semester						
Subject Name: ECE 704 CMOS Design		Time: 1.5 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		

Student will be able to
CO1: Design different CMOS circuits using various logic families along with their circuit layout.
CO2: Use of tools for VLSI IC design.

CO Map	Question No.	Question	Marks
CO1	Q.1	Moore's Law Plays an Important role in VLSI desig	3
CO1	Q.2a	What are Field programmable devices	3
	Q.2b	How the Evolution of VLSI took place	3
CO1	Q.3	What is Y chart	6
CO2	Q.4	What do you mean by channel-stop implantation	3
CO2	Q.5a	What is a ASIC and PLA in VLSI Design	3
	Q.5b	Write Working of MOSFET	3
CO2	Q 6	Different Types of Power consumption in CMOS	6

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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

ECE704							
CMOS DESIGN							
Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U6G6
100	30	70	A-	8	3	3	24
100	30	70	C+	4	3	3	12
100	30	70	C+	4	3	3	12
100	30	70	C+	4	3	3	12
100	30	70	C+	4	3	3	12
100	30	70	C+	4	3	3	12
Total No. of Students			=	6			
Total No. of Students			>60% marks	1	16.66667		
Attainment Level					Level 1		

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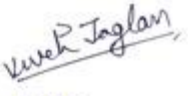

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
Course Handout
Course : MOBILE COMMUNICATIONS
Course Code : ECE707, Crédits : 03, Session :2023-24(Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr Rinkoo Bhatia

K. Introduction: This course introduce about global system for mobile, 2.5G, 3G technologies, how wireless communication system works and what is FDMA, TDMA. This course also introduce some facts about propagation models.

L. Course Outcomes: At the end of the course, students will demonstrate the ability to:

ECE707.1. Explain the basic physical and technical settings functioning of mobile communications systems

ECE707.2. Describe the basic principles of mobile communication system

ECE707.3. Describe the development and implementation of mobile communication systems,

M. Programme Outcomes:

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for

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sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **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

N. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to apply the knowledge to understand, analyze and develop complex Engineering solutions in the field of Electronic Devices, Electronics Networks, Analog and Digital circuits, and Telecommunication Communication networks.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in hardware and software project development using necessary hardware skills and open-ended programming environments to deliver a quality product in multidisciplinary domain.

PSO3. Successful career and Entrepreneurship: An ability to employ modern technology and software platforms in creating innovative career paths in Industry, as an Entrepreneur and a zest for higher studies.

PSO4.Research and Development: An ability to undertake research for the development of new ideas, technology and Engineering solutions for societal benefit.

O. 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 studentto 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	End Semester Examination	EE	70%

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Examination			
Total			**100%**

P. Syllabus

Module I: Introduction to Wireless Communication System: (6 Hours)

Evolution of mobile radio communication, Mobile radiotelephony in U.S., Mobile radio system around the world, second generation (2G) cellular network, evolution to 2.5G wireless network, evolution for 2.5G TDMA standards, third generation (3G) wireless network.

Module II: The Cellular Concept: (6 Hours)

System design fundamentals, frequency reuse channel assignment strategies, Hand off strategies, Interference and system capacity, improving coverage and capacity in cellular system.

Module III: Propagation Model and Spread Spectrum Modulation Techniques: (6 Hours)

Longley rice model, okumara model, hata model, pcs extension to hata model, wolfish and bertoni model, Pseudo Noise (PN) sequence, Direct sequence spread spectrum (DSSS), frequency hopped spread spectrum (FHSS).

Module IV: Multiple Access Techniques for Wireless Communication: (6 Hours)

Introduction to multiple access, Frequency division multiple access (FDMA), Time division Multiple access (TDMA), Spread spectrum multiple access, Packet Radio.

Module V: Global System for Mobile: (6 Hours)

Global system for mobile (GSM), GSM system architecture, GSM radio subsystem, GSM channel types, Example of a GSM cell, Frame structure of GSM.

Q. 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

R. Suggested Text/Reference Books:

- Wireless Communications, Theodore S. Rappaport
- Wireless Communications & Networks by William Stallings.
- Wireless Intelligent Networking by Gerry Christensen, Robert Duncan, Paul G. Florack

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S. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction to subject and books	Lecture	ECE707.1	Mid Term, Quiz & End Sem Exam
2	Introduction to Wireless Communication System, Evolution of mobile radio communication, Mobile radiotelephony in U.S., Mobile radio system around the world,	Lecture	ECE707.1	Mid Term, Quiz & End Sem Exam
3	evolution to 2.5G wireless network, evolution for 2.5G TDMA standards, third generation (3G) wireless network.	Lecture	ECE707.1	Mid Term, Quiz & End Sem Exam
4	IS-95 for 2.5G CDMA	Lecture	ECE707.1	Mid Term, Quiz & End Sem Exam
5	3G W-CDMA, CDMA2000,	Lecture	ECE707.1	Mid Term, Quiz & End Sem Exam
6	WLL, Bluetooth and PANs, WLAN,Summary of module	Lecture	ECE707.1	Mid Term, Quiz & End Sem Exam
7	Module II: The Cellular Concept System design fundamentals, Frequency Reuse	Lecture	ECE707.1	Mid Term, Quiz & End Sem Exam
8	channel assignment strategies	Lecture	ECE707.1	Mid Term, Quiz & End Sem Exam
9	Handoffs, Types of Handoff,Prioritizing handoff, Practical handoff considerations	Lecture	ECE707.1	Mid Term, Quiz & End Sem Exam
10	Co-channel Interference and System capacity ,Adjacent channel interference,Power control for reducing interference	Lecture	ECE707.1	Mid Term, Quiz & End Sem Exam
11	Cell splitting, sectoring	Lecture	ECE707.1	Mid Term, Quiz & End Sem Exam
12	Repeaters for range extension, Microcell	Lecture	ECE707.1	Mid Term, Quiz & End Sem Exam

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	concept			
13	Discussion and problem solving on module1 and 2	Tutorial	ECE707.1	Mid Term, Quiz & End Sem Exam
14	conduction and result of quiz on module 1and 2	Quiz	ECE707.1	Mid Term, Quiz & End Sem Exam
15	Module IV: Multiple Access Techniques for WirelessIntroduction to multiple access, Frequency division multiple access (FDMA), Time division Multiple access (TDMA	Lecture	ECE707.2	Assignment & End Sem Exam
16	Spread spectrum multiple access, Packet Radio.	Lecture	ECE707.2	Assignment & End Sem Exam
17	Pseudo Noise (PN) sequence,generation methods	Lecture	ECE707.2	Assignment & End Sem Exam
18	Numericals on sequence generation	Lecture	ECE707.2	Assignment & End Sem Exam
19	Direct sequence spread spectrum (DSSS), frequency hopped spread spectrum (FHSS).	Lecture	ECE707.2	Assignment & End Sem Exam
20	Module III: Propagation ModelsFree space propagation model and propagation phenomenon	Lecture	ECE707.2	Assignment & End Sem Exam
21	Longley rice model okumara model	Lecture	ECE707.2	Assignment & End Sem Exam
22	hata model pcs extension to hata model	Lecture	ECE707.2	Assignment & End Sem Exam
23	wolfish and bertoni model	Lecture	ECE707.2	Assignment & End Sem Exam
24	numericals on module 3	Lecture	ECE707.2	-
25	Assignment on module 2 and 3	Assignment	ECE707.2	-
26	Module V: Global System for Mobile: Services and features	Lecture	ECE707.3	Quiz & End Sem Exam
27	GSM system architecture	Lecture	ECE707.3	Quiz & End Sem Exam
28	GSM radio subsystem	Lecture	ECE707.3	Quiz & End Sem Exam
29	GSM radio subsystem	Lecture	ECE707.3	Quiz & End Sem Exam
30	GSM channel types, Traffic and control channels	Lecture	ECE707.3	Quiz & End Sem Exam
31	GSM channel types, Traffic and control channels	Lecture	ECE707.3	Quiz & End Sem Exam
32	Example of a GSM cell,	Lecture	ECE707.3	Quiz & End Sem

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				Exam
33	Frame structure of GSM.	Lecture	ECE707.3	Quiz & End Sem Exam
34	Signal processing in GSM	Lecture	ECE707.3	Quiz & End Sem Exam
35	Quiz on module 5	Quiz	ECE707.3	-
36	problem solving and revision	Revision	ECE707.3	-

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO3
ECE707.1.	Explain the basic physical and technical settings functioning of mobile communications systems	3	1	2	3	-	**-**	**-**	**-**	1		2	3	**3**	**1**	**2**	**3**
ECE707.2	Describe the basic principles of mobile communication system	3	2	1	-	-	**1**	**1**	**-**	-	**-**	1	3	**3**	**3**	**2**	**3**
ECE707.3	Describe the development and implementation of mobile communication systems,	3	3	1	-	1	**-**	**-**	**-**	3	**1**	3	3	**3**	**2**	**3**	**3**

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Sample Question Paper

Amity School of Engineering and Technology Department of Computer Science and Engineering I MID-SEMESTER (SEM –VII) 2023-24						
Class: B.Tech.(ECE) VII Semester						
Subject Name: ECE 707 Mobile Communication		Time: 1.5 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1-10,13,16	Q.11,12	Q.14	Q.15,17		Q.18

Student will be able to
CO1: Explain the basic physical and technical settings functioning of mobile communications systems
CO2: Describe the basic principles of mobile communication system

CO Map	Question No.	Question	Marks
CO1	Q.1-10	Multiple choice 10 questions	5
CO2	Q. 11	Explain how a call is made in Cellular Telephone system.	3
	Q.12	What are the different types of Handoff's encountered in Mobile Communications?	3
CO1	Q.13	Write a note on Second generation Cellular Networks.	3
CO2	Q.14	What are the factors to be considered while splitting a cell? What are its disadvantages?	3
CO2	Q.15	What is Adjacent channel Interference? How can it be minimized?	3
CO1	Q.16	Write a note on Third generation Wireless Networks.	5
CO2	Q.17	Explain the concept of "FREQUENCY REUSE" as applied to Cellular Communications. What are the advantages of this approach ?	5
CO2	Q.18	If a total of 33 MHz of bandwidth is allocated to a particular Cellular telephone system which uses two 25 KHz simplex channels to provide full Duplex voice and control channels	5

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		calculate the number of channels available per cell if s system uses a (i) 4 cell cluster, (ii) 7 cell cluster, (iii) 12 cell cluster. If 1 MHz of the allocated spectrum is dedicated to control channels, determine how control and voice channels can be distributed for each of the three systems.	

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

ECE707							
MOBILE COMMUNICATIONS							
Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U7G7
100	30	70	A-	8	3	3	24
100	30	70	B+	7	3	3	21
100	30	70	C+	4	3	3	12
100	30	70	B+	7	3	3	21
100	30	70	B	6	3	3	18
100	30	70	B-	5	3	3	15
Total No. of Students			=	6			
Total No. of Students			>60% marks	1	16.66667		
Attainment Level					Level 1		

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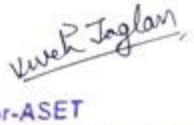

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MADHYA PRADESH

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

Course Code : ECE 721, Crédits : 01, Session :2023-24(Odd Sem.), Class : B.Tech. 4th Year

Faculty Name : Dr. Raghavendra Sharma

A. Introduction: To provide the concepts of optical fibres, sources and detectors used in optical communication systems. Wave propagation in cylindrical fibres, step and graded index fibres, single-mode fibres and measure the losses in optical fibers.

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

ECE 721.1. Calculate the Numerical Aperture of a multimode Fiber.

ECE 721.2. Measure the coupling losses of the Fiber.

ECE 721.3. Set up the analog and digital link of optical fiber

ECE 721.4. Study Time division Multiplexing..

ECE 721.5. Study Manchester Coding.

ECE 721.6. Simulate optical fiber wave guide.

C. Programme Outcomes:

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for

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sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **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

D. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to apply the knowledge to understand, analyze and develop complex Engineering solutions in the field of Electronic Devices, Electronics Networks, Analog and Digital circuits, and Telecommunication Communication networks.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in hardware and software project development using necessary hardware skills and open-ended programming environments to deliver a quality product in multidisciplinary domain.

PSO3. Successful career and Entrepreneurship: An ability to employ modern technology and software platforms in creating innovative career paths in Industry, as an Entrepreneur and a zest for higher studies.

PSO4.Research and Development: An ability to undertake research for the development of new ideas, technology and Engineering solutions for societal benefit.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term Viva	CT	15%
	Mid Term Performance		
	Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a studentto 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	End Semester Practical Examination	EE	70%

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Examination			
Total			**100%**

F. Course Contents:

1. To measure the Numerical Aperture of a multimode fiber. (2 Hours)
2. To measure attenuation by cut Back technique. (2 Hours)
3. To study the model properties of a multimode fiber. (2 Hours)
4. To couple the light into a single mode fiber & measure the far-field power distribution. (2 Hours)
5. To measure various fiber alignment losses. (2 Hours)
6. To estimate the power budget for a fiber optic system. (2 Hours)
7. To set up a fiber optic analog link. (2 Hours)
8. To set up a fiber optic digital link. (2 Hours)
9. To study Time Division Multiplexing of signals. (1 Hour)
10. To study Manchester Coding. (1 Hour)
11. To study voice digitization. (1 Hour)
12. To simulate optical fiber wave guide. (1 Hour).

	IA				EE	
Components	**A**	**PR**	**LR**	**V**	**PR**	**V**
Weightage (%)	5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

G. Experiment Plan

Experiment	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	To measure the Numerical Aperture of a multimode fiber	Practical	ECE 721.1	Mid Term Viva-1, Quiz & End Sem Pect. Exam
2	To measure attenuation by cut Back technique	Practical	ECE 721.1	Mid Term Viva-1, Quiz & End Sem Pect. Exam
3	To study the model properties of a multimode fiber	Practical	ECE 721.6	Mid Term Viva-1, Quiz & End Sem Pect. Exam
4	To couple the light into a single mode fiber & measure the far-field power distribution	Practical	ECE 721.2	Mid Term Viva-1, Quiz & End Sem Pect. Exam
5	To measure various fiber alignment losses	Practical	ECE 721.2	Mid Term Viva-2, Quiz & End Sem Pect. Exam
6	To estimate the power budget for a fiber optic system	Practical	ECE 721.2	Mid Term Viva-2, Quiz & End Sem Pect. Exam
7	To set up a fiber optic analog link	Practical	ECE 721.3	Mid Term Viva-2, Quiz & End Sem Pect. Exam
8	To set up a fiber optic digital link	Practical	ECE 721.3	Mid Term Viva-2, Quiz & End

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				Sem Pect. Exam
9	To study Time Division Multiplexing of signals	Practical	ECE 721.4	Mid Term Viva-3, Quiz & End Sem Pect. Exam
10	To study Manchester Coding	Practical	ECE 721.5	Mid Term Viva-3, Quiz & End Sem Pect. Exam
11	To study voice digitization	Practical	ECE 721.3	Mid Term Viva-3, Quiz & End Sem Pect. Exam
12	To simulate optical fiber wave guide	Practical	ECE 721.6	Mid Term Viva-3, Quiz & End Sem Pect. Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
ECE721.1	Calculate the Numerical Aperture of a multimode Fiber	3	3	**3**	-	-	**-**	**-**	**-**	**1**	**2**	**-**	1	3	2	1	-
ECE721.2	Measure the coupling losses of the Fiber	3	2	2	-	-				2	**1**	**-**	1	3	1	1	-
ECE721.3	Set up the analog and digital link of optical fiber	3	2	2	-	-				2	**2**	-	1	2	1	1	-
ECE721.4	Study Time division Multiplexing	3	2	2	-	-				2	**2**	-	2	2	1	2	2

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ECE721.5	Study Manchester Coding	3	1	1	1					1	**1**		2	2	1	2	2
ECE721.6	Simulate optical fiber wave guide	3	2	1	2					1	**2**		1	1	1	3	3

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

ECE721							
FIBER OPTIC COMMUNICATION LAB							
Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U3G3
100	30	70	A+	10	1	1	10
100	30	70	A-	8	1	1	8
100	30	70	A+	10	1	1	10
100	30	70	A	9	1	1	9
100	30	70	A-	8	1	1	8
100	30	70	A-	8	1	1	8
Total No. of Students			=	6			
Total No. of Students			>60% marks	6	100		
Attainment Level					Level 3		

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

Course Code : ECE 724, Crédits : 01, Session :2023-24(Odd Sem.), Class : B.Tech. 4th Year

Faculty Name : Dr. Ajay Kumar Dadoria

A. Introduction: This course gives the opportunity to the students to learn about the configuration and simulation of Very Large Scale Integrated Circuits & Systems. The main purpose of this lab course is to explore various design style of simple and complex Integrated Circuits(IC) near to students. In this laboratory students are able to understand about models and model parameters of MOSFET amplifier CMOS Inverter etc. which are suited for IC Technology.

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

ECE 724.1. Understand the concepts of digital system design methods through practical domain.

ECE 724.2. Design of combinational and sequential circuits using CAD.

ECE 724.3. To analyse and layout design of CMOS circuits in micron and submicron level using any platform

C. Programme Outcomes:

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

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[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **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

D. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to apply the knowledge to understand, analyze and develop complex Engineering solutions in the field of Electronic Devices, Electronics Networks, Analog and Digital circuits, and Telecommunication Communication networks.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in hardware and software project development using necessary hardware skills and open-ended programming environments to deliver a quality product in multidisciplinary domain.

PSO3. Successful career and Entrepreneurship: An ability to employ modern technology and software platforms in creating innovative career paths in Industry, as an Entrepreneur and a zest for higher studies.

PSO4.Research and Development: An ability to undertake research for the development of new ideas, technology and Engineering solutions for societal benefit.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal	Mid Term Viva	CT	15%

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Evaluation	Mid Term Performance		
	Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a studentto 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 Practical Examination	EE	70%
Total			**100%**

F. Course Contents:

1. MOSFET characteristics with varying V_{GS} for both PMOS and NMOS.
2. Effect on VTC of CMOS inverter with variation of W and L.
3. Transient analysis of CMOS inverter with varying capacitive load, W and L.
4. Rise time, Fall time power dissipation, propagation delay calculation of CMOS inverter with the variation of capacitive load, W and L.
5. NOR and NAND gate - Transient analysis.
6. XOR/XNOR gate - Transient analysis.
7. 2:1 MUX and XOR gate with P.T.L.- Transient analysis.
8. D type latch and flip flop - Transient analysis.
9. 3 input NAND gate implementation with DOMINO (recharge and evaluation).
10. 4 inverter chain to derive capacitive load.

	IA				EE	
Components	**A**	**PR**	**LR**	**V**	**PR**	**V**
Weightage (%)	5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

G. Experiment Plan

Experiment	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	MOSFET characteristics with varying V_{GS} for both PMOS and NMOS	Practical	ECE 724.1	Mid Term Viva-1, Quiz & End Sem Pect. Exam
2	Effect on V_{TC} of CMOS inverter with variation of W and L	Practical	ECE 724.1	Mid Term Viva-1, Quiz & End Sem Pect. Exam
3	Transient analysis of CMOS inverter with varying capacitive load, W and L	Practical	ECE 724.1	Mid Term Viva-1, Quiz & End Sem Pect. Exam

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4	Rise time, Fall time power dissipation, propagation delay calculation of CMOS inverter with the variation of capacitive load, W and L	Practical	ECE 724.1	Mid Term Viva-1, Quiz & End Sem Pect. Exam
5	Rise time, Fall time power dissipation, propagation delay calculation of CMOS inverter with the variation of capacitive load, W and L	Practical	ECE 724.2	Mid Term Viva-2, Quiz & End Sem Pect. Exam
6	NOR and NAND gate - Transient analysis	Practical	ECE 724.2	Mid Term Viva-2, Quiz & End Sem Pect. Exam
7	XOR/XNOR gate - Transient analysis.	Practical	ECE 724.2	Mid Term Viva-2, Quiz & End Sem Pect. Exam
8	2:1 MUX and XOR gate with P.T.L.- Transient analysis.	Practical	ECE 724.2	Mid Term Viva-2, Quiz & End Sem Pect. Exam
9	2:1 MUX and XOR gate with P.T.L.- Transient analysis.	Practical	ECE 724.3	Mid Term Viva-3, Quiz & End Sem Pect. Exam
10	D type latch and flip flop - Transient analysis	Practical	ECE 724.3	Mid Term Viva-3, Quiz & End Sem Pect. Exam
11	3 input NAND gate implementation with DOMINO (recharge and evaluation)	Practical	ECE 724.3	Mid Term Viva-3, Quiz & End Sem Pect. Exam
12	4 inverter chain to derive capacitive load	Practical	ECE 724.3	Mid Term Viva-3, Quiz & End Sem Pect. Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
ECE724.1	Understand the concepts of digital system design	3	3	1	3	1				2		2	1		2	1	

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	methods through practical domain.																
ECE724.2	Design of combinational and sequential circuits using CAD	3	2	2	2	2				2		1	1	1			2
ECE724.3	To analyze and layout design of CMOS circuits in micron and submicron level using any platform	3	2	2	2	2				2		1	1		2	1	

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering I MID-SEMESTER Viva (SEM –VII) 2023-24						
Class: B.Tech.(ECE) VII Semester						
Subject Name: ECE 724 CMOS Design Lab		Time: 2 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		
Student will be able to CO1: Understand the concepts of digital system design methods through practical domain. CO2: Design of combinational and sequential circuits using CAD. CO3: To analyze and layout design of CMOS circuits in micron and submicron level using any platform.						

CO Map	Question No.	Question	Marks
CO1	Q.1	Moore's Law Plays an Important role in VLSI design	2
CO1	Q.2a	What are Field programmable devices	2
	Q.2b	How the Evolution of VLSI took place	3
CO1	Q.3	What is Y chart	3
CO2	Q.4	What do you mean by channel-stop implantation	3
	Q.5a	What is a ASIC and PLA in VLSI Design	3

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CO2	Q.5b	Explain Working of MOSFET	3
CO2	Q.6	Different Types of Power consumption in CMOS	3
CO3	Q.7a	Explain DC Characteristics of CMOS	3
CO3	Q.7b	Why NMOS is Preferred then PMOS Transistor	3
CO3	Q.8	Why CMOS Fails at 32nm Technology	2

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

ECE724							
CMOS DESIGN LAB							
Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U5G5
100	30	70	A+	10	1	1	10
100	30	70	A	9	1	1	9
100	30	70	B+	7	1	1	7
100	30	70	A	9	1	1	9
100	30	70	A	9	1	1	9
100	30	70	A-	8	1	1	8
Total No. of Students			=	6			
Total No. of Students			>60% marks	5	83.33333		
Attainment Level					Level 3		

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AMITY UNIVERSITY

MADHYA PRADESH

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

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
Course Handout
Course : INFORMATION THEORY & CODING
Course Code : ECE801, Crédits : 03, Session :2023-24(Even Sem.), Class : B.Tech. 4th Year
Faculty Name : Mrs Rinkoo Bhatia

U. ***Introduction:*** This course introduces how various coding takes place in communication and what type of different codes are used in communication system. It also introduces different entropies, channel capacity and purpose of encoding.

V. **Course Outcomes**: At the end of the course, students will demonstrate the ability to:

ECE801.1. Understand the concept of information and entropy
ECE801.2. Understand Shannon's theorem for coding
ECE801.3. Calculation of channel capacity
ECE504.4. Apply coding techniques

W. **Programme Outcomes:**

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering

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solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

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[PO.12]. **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

X. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to apply the knowledge to understand, analyze and develop complex Engineering solutions in the field of Electronic Devices, Electronics Networks, Analog and Digital circuits, and Telecommunication Communication networks.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in hardware and software project development using necessary hardware skills and open-ended programming environments to deliver a quality product in multidisciplinary domain.

PSO3. Successful career and Entrepreneurship: An ability to employ modern technology and software platforms in creating innovative career paths in Industry, as an Entrepreneur and a zest for higher studies.

PSO4.Research and Development: An ability to undertake research for the development of new ideas, technology and Engineering solutions for societal benefit.

Y. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a studentto be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	A	5%

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End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

Z. Syllabus

Module 1: Information Theory: (06 Hours)

Introduction to uncertainty, information, entropy and its properties, entropy of binary memory less source and its extension to discrete memory less source, coding theorem, data compression, prefix coding, HUFFMAN coding, Lempel-Ziv Coding.

Module II: Channels and Capacity: (06 Hours)

Discrete memory less channels, Binary symmetric channel, mutual information & its properties, channel capacity, channel coding theorem, and its application to BSC, Shannon's theorem on channel capacity, capacity of channel of infinite bandwidth, Bandwidth signal to noise Trade off, Practical communication system in light of shannon's theorem, Fading Channel.

Module III: Galois Fields: (06 Hours)

Group and field of Binary system Galois field and its construction in GF (2m) and its basic properties,vector spaces and matrices in GF(2), Linear Block Codes, Systematic codes, and its encoding circuits, syndrome and error detection ,minimum distance, error detecting and correcting capabilities of block code, Decoding circuits, Probability of undetected error for linear block code in BSC, Hamming code and their applications.

ModuleIV:Cyclic-Codes: (06Hours)

Cyclic codes and its basic properties, Generator & parity check matrix of cyclic codes, encoding & decoding circuits, syndrome computation & error detection, cyclic Hamming codes.

Module V: BCH and Convolution codes: (06 Hours)

Introduction to BCH codes, its encoding & decoding, error location & correction.
Introduction to convolution codes, its construction & viterbi algorithm for maximum likelihood decoding.

AA. 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

BB. Suggested Text/Reference Books:

- Digital Communication by Haykins Simon Wiley Publ.
- Error control Coding: Theory and Application, by Shu Lin and Cosstlello,PHI
- Modern analog and Digital Communication system, by B.P. Lathi
- Digital Communication by Sklar, Pearson Education
- Principal of Communication system by Taub & Schilling, TMH
- Error Correcting Codes by Peterson W., MIT Press
- Digital Communication By Das , Mullick, Chatterjee,.

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CC. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction to ITC, , need ,applications , Books to be refered	Lecture	**ECE801.1**	Mid Term-1, Quiz & End Sem Exam
2	Module III:Galois FieldsCoding, Groups, Definition, examples, numericals	Lecture	**ECE801.4**	Mid Term-1, Quiz & End Sem Exam
3	Fields,Definition, examples, numericals	Lecture	**ECE801.4**	Mid Term-1, Quiz & End Sem Exam
4	Vector space ,Linear Spaces over Binary Fields	Lecture	**ECE801.4**	Mid Term-1, Quiz & End Sem Exam
5	Construction of Galois field GF (2m), Basic Properties of Galois Field GF (2m),	Lecture	**ECE801.4**	Mid Term-1, Quiz & End Sem Exam
6	), Linear Block Codes, Systematic codes, and its encoding circuits,	Lecture	**ECE801.4**	Mid Term-1, Quiz & End Sem Exam
7	minimum distance, error detecting and correcting capabilitiesof block code, Decoding circuits, Probability of undetected error for linear block code	Lecture	**ECE801.4**	Mid Term-1, Quiz & End Sem Exam
8	syndrome and error detection	Lecture	**ECE801.4**	Mid Term-1, Quiz & End Sem Exam
9	Numerical practice	Lecture	**ECE801.4**	Mid Term-1, Quiz & End Sem Exam
10	Module IV:Cyclic Codes, Cyclic codes and its basic properties, Generator & parity check matrix of cyclic codes,	Lecture	**ECE801.4**	Mid Term-1, Quiz & End Sem Exam
11	encoding & decoding circuits	Lecture	**ECE801.4**	Mid Term-1, Quiz & End Sem Exam
12	syndrome computation & error detection	Lecture	**ECE801.4**	Mid Term-1, Quiz & End Sem Exam
13	Hamming code and their	Lecture	**ECE801.4**	Mid Term-1, Quiz

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	applications. Hamming code and their applications. Hamming code and their applications. Hamming code and their applications.			& End Sem Exam
14	Numericals practice	Lecture	**ECE801.4**	Mid Term-1, Quiz & End Sem Exam
15	Quiz module III and IV	Assesm ent		Mid Term-1, Quiz & End Sem Exam
16	Module V:BCH and Convolution codes, Introduction to BCH codes, its encoding & decoding, error location & correction.	Lecture	**ECE801.4**	Mid Term-1, Quiz & End Sem Exam
17	Introduction to convolution codes, its construction	Lecture	**ECE801.4**	Mid Term-1, Quiz & End Sem Exam
18	Numericals	Lecture	**ECE801.4**	Mid Term-1, Quiz & End Sem Exam
19	viterbi algorithm for maximum likelihood decoding.	Lecture	**ECE801.4**	Mid Term-1, Quiz & End Sem Exam
20	viterbi algorithm for maximum likelihood decoding.	Lecture	**ECE801.4**	Mid Term-1, Quiz & End Sem Exam
21	Module I:Information Theory , Introduction to uncertainty, information, entropy and its properties	Lecture	**ECE801.1**	Test & End Sem Exam
22	entropy of binary memory less source and its extension to discrete memory less source	Lecture	**ECE801.1**	Test & End Sem Exam
23	coding theorem, data compression, prefixcoding,	Lecture	**ECE801.2**	Test & End Sem Exam
24	HUFFMAN coding, Lempel-Ziv Coding,Shanon Fano coding,numericals	Lecture	**ECE801.2**	Test & End Sem Exam
25	HUFFMAN coding, Lempel-Ziv Coding,Shanon Fano coding,numericals	Lecture	**ECE801.2**	Test & End Sem Exam
26	HUFFMAN coding,	Lecture	**ECE801.2**	Test & End Sem

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	Lempel-Ziv Coding,Shanon Fano coding,numericals			Exam
27	Module II:Channels and Capacity, Discrete memory less channels, Binary symmetric channel	Lecture	**ECE801.3**	Test & End Sem Exam
28	Numericals	Lecture	**ECE801.3**	Test & End Sem Exam
29	mutual information & its properties,channel capacity, channel coding theorem, and its application to BSC	Lecture	**ECE801.3**	Test & End Sem Exam
30	Numericals	Lecture	**ECE801.3**	Test & End Sem Exam
31	Shannon's theorem on channelcapacity, capacity of channel of infinite bandwidth	Lecture	**ECE801.3**	Test & End Sem Exam
32	Numericals	Lecture	**ECE801.3**	Test & End Sem Exam
33	Bandwidth signal to noise Trade off, Practical communication system in light of shannon's theorem	Lecture	**ECE801.2, 3**	Test & End Sem Exam
34	Numerical	Lecture	**ECE801.2, 3**	Test & End Sem Exam
35	Test	Assesm ent		
36	Revision	Lecture		End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
ECE801.1	Understand the concept of information and entropy	3	3	1	1	2			**1**	2	**1**	2	3	**3**	**3**	**2**	**3**

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ECE801.2	Understand Shannon's theorem for coding	3	3	3	1	3			**1**	2	**3**	1	3	**3**	**3**	**2**	**3**
ECE801.3	Calculation of channel capacity	3	2	2	2	2				3		3	1	**3**	**3**	**2**	**3**
ECE801.4	Apply coding techniques	3	3	2	3	2				1		2	1	**3**	**3**	**2**	**3**

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Sample Question Paper

Amity School of Engineering and Technology Department of Computer Science and Engineering I MID-SEMESTER (SEM –VIII) 2023-234						
Class: B.Tech.(ECE) VIII Semester						
Subject Name: ECE 801 ITC		Time: 2 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1-10,12	Q.16,17	Q.11,14		Q.13,15	Q.18
Student will be able to CO4: Apply coding techniques						

CO Map	Question No.	Question	Marks
CO4	Q.1-10	Multiple choice questions	5
CO4	Q.11	Draw the block diagram of an Encoder for a linear (n,k) block code and explain its working.	3
	Q.12	Define the following with an example: 1). Weight of a code 2). Hamming Distance 3). Primitive Polynomial	3
CO4	Q.13	Construct Prime Field GF(11) under modulo-11 addition and multiplication.	6
CO4	Q.14	Define Irreducible polynomial. Show that $X^5 + X^3 + 1$ is irreducible over GF (2).	3
CO4	Q.15	Consider a systematic block code whose parity check equations are $P_1 = m_1 + m_2 + m_4$, $p_2 = m_1 + m_3 + m_4$, $p_3 = m_1 + m_2 + m_3$, $p_4 = m_2 + m_3 + m_4$ Find the generator and Parity check matrix for this code. Is the vector (01011100) a valid Code vector	3
	Q.16	Write short notes on any one a) Vector Spaces b) Hamming Codes c) Standard Array for block codes.	5
CO4	Q.17	Define Group. State and prove its properties.	5

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CO$	Q.18	. A systematic (6,3) code has the following generator matrix: $G = \begin{bmatrix} 1 & 0 & 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 & 0 & 1 \end{bmatrix}$ a) Find all the code vectors b) Find the Minimum weight of the code c) Find the Parity Check matrix	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

ECE801							
INFORMATION THEORY AND CODING							
Max Marks	CE Weightage (%)	ET Weightage (%)	GO	GP	ACU	ECU	U2G2
100	30	70	A+	10	3	3	30
100	30	70	B+	7	3	3	21
100	30	70	B+	7	3	3	21
100	30	70	B+	7	3	3	21
100	30	70	C+	4	3	3	12
100	30	70	B+	7	3	3	21
Total No. of Students			=	6			
Total No. of Students			>60% marks	1	16.66667		
Attainment Level					Level 1		

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
Course Handout
Course : RADAR & SATELLITE COMMUNICATIONS
Course Code : ECE 802, Crédits : 03, Session :2023-24(Even Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Shally Goyal, Dr. Vivek Singh Kushwah

A. **Introduction:** This course builds basic knowledge of different types of Radar systems and satellite communication along with link designing & application. It also covers different modulation schemes & channels used.

B. **Course Outcomes:** At the end of this course students will demonstrate the ability to

ECE802.1. Visualize the architecture of different types of Radar systems and satellite systems as a means of high speed, high range communication system.
ECE802.2. State various aspects related to satellite systems such as orbital equations, sub-systems in a satellite, link budget, modulation and multiple access schemes.
ECE802.3. Solve numerical problems related to orbital motion and design of link budget for the given parameters and conditions

C. **Programme Outcomes:**
[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and

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norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **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

D. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to apply the knowledge to understand, analyze and develop complex Engineering solutions in the field of Electronic Devices, Electronics Networks, Analog and Digital circuits, and Telecommunication Communication networks.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in hardware and software project development using necessary hardware skills and open-ended programming environments to deliver a quality product in multidisciplinary domain.

PSO3. Successful career and Entrepreneurship: An ability to employ modern technology and software platforms in creating innovative career paths in Industry, as an Entrepreneur and a zest for higher studies.

PSO4.Research and Development: An ability to undertake research for the development of new ideas, technology and Engineering solutions for societal benefit.

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	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a studentto 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	End Semester Examination	EE	70%

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Examination			
Total			**100%**

F. Syllabus

Module 1: Introduction to Radar: (06 Hours)

Principle of detection and ranging, Radar frequencies and bands. Applications, Radar block diagram and operation. Radar Range Equation: Range prediction, Minimum detectable signal, Receiver noise SNR, Integration of radar pulses, Radar cross section of targets, Transmitter Power, PRF and system losses & Propagation effects.

Module II: CW FM Radar: (06 Hours)

Doppler effect, CW Radar, Frequency-modulated CW Radar, Multiple-frequency CW Radar. MTI and Pulse Doppler Radar: MTI delay lines, Delay line Cancellers, Coherent and Non-Coherent MTI, Pulse Doppler Radar.

Module III: Introduction to Satellite: (06 Hours)

Communication satellites, Orbiting satellites, Frequencies and bands, Satellite multiple access formats. Satellite Channel: Power flow, Polarization, Atmospheric losses, Receiver noise, CNR, Satellite link analysis for uplinks and downlinks. Overview of Coaxial cable system and optical Network (SONET); Overview of WLL (Wireless loop)

Module IV: Satellite Transponder: (06 Hours)

Transponder model, Satellite signal processing RF-RF translation, IF demodulation.

Module V: Multiple-Access: (06 Hours)

FDMA; amplification with multiple FDMA carriers, AM/FM Conversion with FDMA, Switched FDMA, Synchronization, SS-TDMA; CDMA; DS CDMA, Frequency- hopped, CDMA. Carrier recovery & bit timing. Satellite link budget analysis

Module VI: Industrial Visit

One day visit to local industry in the field of Electronics Engineering.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Introduction to Radar Systems - M.I. Skolnik
- Radar Fundamentals - G.J. Wheeler.
- Radar Engineering - D.G. Rink
- Satellite Communication - R.M. Gagliardi
- Satellite Communication - T. Pratt & C.W. Boston
- Satellite Communication System Design Principles - M. Richharia

G. Lecture Plan

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Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Principle of detection and ranging,	Lecture	ECE 802.1	Mid Term-1, Quiz & End Sem Exam
2	Radar frequencies and bands.	Lecture	ECE 802.1	Mid Term-1, Quiz & End Sem Exam
3	Applications	Lecture	ECE 802.1	Mid Term-1, Quiz & End Sem Exam
4	Radar block diagram and operation.	Lecture	ECE 802.1	Mid Term-1, Quiz & End Sem Exam
5	Radar Range Equation : Range prediction,	Lecture	ECE 802.1	Mid Term-1, Quiz & End Sem Exam
6	Minimum detectable signal, Receiver noise	Lecture	ECE 802.1	Mid Term-1, Quiz & End Sem Exam
7	SNR, Integration of radar pulses	Lecture	ECE 802.1	Mid Term-1, Quiz & End Sem Exam
8	Radar cross section of targets, Transmitter Power	Lecture	ECE 802.1	Mid Term-1, Quiz & End Sem Exam
9	PRF and system losses & Propagation effects.	Lecture	ECE 802.1	Mid Term-1, Quiz & End Sem Exam
10	Doppler effect, CW Radar,	Lecture	ECE 802.1	Mid Term-1, Quiz & End Sem Exam
11	Frequency-modulated CW Radar,	Lecture	ECE 802.1	Mid Term-1, Quiz & End Sem Exam
12	Multiple-frequency CW Radar	Lecture	ECE 802.1	Mid Term-1, Quiz & End Sem Exam
13	MTI and Pulse Doppler Radar:	Lecture	ECE 802.1	Mid Term-1, Quiz & End Sem Exam
14	MTI delay lines,	Lecture	ECE 802.1	Mid Term-1, Quiz & End Sem Exam
15	Delay line Cancellers	Lecture	ECE 802.1	Mid Term-1, Quiz & End Sem Exam
16	Coherent and Non-Coherent MTI	Lecture	ECE 802.1	Mid Term-1, Quiz & End Sem Exam
17	Pulse Doppler Radar	Lecture	ECE 802.1	Mid Term-1,Assignment, Quiz & End Sem Exam
18	Communication satellites, Orbiting satellites, Frequencies and bands	Lecture	ECE 802.1	Assignment, Quiz & End Sem Exam
19	Satellite multiple access formats	Lecture	ECE 802.2	Assignment, Quiz & End Sem Exam
20	Satellite Channel: Power flow,	Lecture	ECE 802.2	Assignment, Quiz & End Sem Exam
21	Polarization, Atmospheric losses,	Lecture	ECE 802.2	Assignment, Quiz & End Sem Exam
22	Receiver noise, CNR	Lecture	ECE 802.3	Assignment, Quiz & End Sem Exam

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23	Satellite link analysis for uplinks	Lecture	ECE 802.3	Assignment, Quiz & End Sem Exam
24	Satellite link analysis for downlinks.	Lecture	ECE 802.2	Assignment, Quiz & End Sem Exam
25	Overview of Coaxial cable system and optical Network (SONET);	Lecture	ECE 802.2	Assignment, Quiz & End Sem Exam
26	Overview of WLL (Wireless loop)	Lecture	ECE 802.2	Assignment, Quiz & End Sem Exam
27	Transponder model	Lecture	ECE 802.2	Assignment, Quiz & End Sem Exam
28	Satellite signal processing	Lecture	ECE 802.2	Assignment, Quiz & End Sem Exam
29	RF-RF translation	Lecture	ECE 802.2	Assignment, Quiz & End Sem Exam
30	IF demodulation.	Lecture	ECE 802.2	Assignment, Quiz & End Sem Exam
31	FDMA ,amplification with multiple FDMA carriers	Lecture	ECE 802.2	Assignment, Quiz & End Sem Exam
32	AM/FM Conversion with FDMA, Switched FDMA, Synchronization	Lecture	ECE 802.2	Assignment, Quiz & End Sem Exam
33	SS-TDMA CDMA; DS CDMA, Frequency- hopped, CDMA	Lecture	ECE 802.2	Assignment, Quiz & End Sem Exam
34	Carrier recovery & bit timing	Lecture	ECE 802.2	Assignment, Quiz & End Sem Exam
35	Satellite link budget analysis	Lecture	ECE 802.3	Assignment, Quiz & End Sem Exam
36	Satellite link budget analysis	Lecture	ECE 802.3	Assignment, Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
ECE802.1.	Visualize the architecture of different types of Radar systems and satellite systems as a means of high speed, high range	3	3	3	2	2	1	1	-	2	1	1	2	**3**	**2**	**2**	**2**

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	communication system.																
ECE802.2.	State various aspects related to satellite systems such as orbital equations, sub-systems in a satellite, link budget, modulation and multiple access schemes.	3	2	2	2	2	1	1	-	3	1	2	1	**3**	**2**	**2**	**2**
ECE802.3.	Solve numerical problems related to orbital motion and design of link budget for the given parameters and conditions.	3	3	2	3	2	1	1	-	1	1	2	1	**2**	**2**	**2**	**2**

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics & Communication Engineering I MID-SEMESTER (SEM –VIII) 2023-24						
Class: B.Tech.(ECE) VIII Semester						
Subject Name: ECE 503 Radar And Satellite Communications		Time: 1.30 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1	Q.2,3	Q.4	Q.2,5,6		
Student will be able to CO1: Visualize the architecture of different types of Radar systems and satellite systems as a means of high speed, high range communication system. CO3: Solve numerical problems related to orbital motion and design of link budget for the given parameters and conditions.						

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CO Map	Question No.	Question	Marks
CO1	Q.1	Draw block diagram of CW Doppler Radar with non-zero IF receiver and explain each block.	3
CO1	Q.2a	Draw the block diagram of Moving Target Indicator radar, explain each block in detail and explain its working principle.	3
	Q.2b	Explain the basic principle of a Radar system. Give the limitations and applications of Radars.	3
CO3	Q.3	Determine the maximum unambiguous range and range resolution of a pulse radar having width is 5 μs at a PRF of 1000Hz.	6
CO3	Q.4	If the transmitted peak power of the radar is 100KW,pulse repetition frequency is 1000pps and the pulse width is 1μs than calculate the average power in dBs	3
CO1	Q.5a	Discuss propagation effect on EM waves in atmospheric conditions. Also explain transmission line loss, duplexer loss and antenna losses in radar in detail.	3
	Q.5b	Explain the working of pulse radar with the help of block diagram.	3
CO3	Q 6	Prove that the maximum range of a radar operating at a given frequency is proportional to the linear dimension of the antenna.	6

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

ECE802							
RADAR & SATELLITE COMMUNICATIONS							
Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U8G8

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100	30	70	A+	10	3	3	30
100	30	70	B+	7	3	3	21
100	30	70	A	9	3	3	27
100	30	70	A-	8	3	3	24
100	30	70	B-	5	3	3	15
100	30	70	B+	7	3	3	21

Total No. of Students	=	6	
Total No. of Students	>60% marks	3	50
Attainment Level			Level 1

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Course Code : ECE 803, Crédits : 03, Session :2023-24(Even Sem.), Class : B.Tech. 4th Year

Faculty Name : Dr. Ajay Kumar Dadoria

EE. Introduction: The syllabus is divided into two parts, the first one deals with 8051 architecture and its interfacing with other devices. Second part of the syllabus deals with the basic embedded system and it's design. A microcontroller is an integrated circuit that is programmable. The syllabus makes student perfect in assembly language programming, addressing modes etc apart from it input-output programming is discussed in detail. In the second part Embedded systems and it's application is discussed. Real Time Operating System is also explained at length.8051 C programming is also incorporated in the syllabus.

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

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ECE 803.1. Suggest design approach using advanced controllers to real-life situations.

ECE 803.2. Design interfacing of the systems with other data handling / processing systems.

ECE 803.3. Appreciate engineering constraints like energy dissipation, data exchange speeds etc.

GG. Programme Outcomes:

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in

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independent and life-long learning in the broadest context of technological change

HH. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to apply the knowledge to understand, analyze and develop complex Engineering solutions in the field of Electronic Devices, Electronics Networks, Analog and Digital circuits, and Telecommunication Communication networks.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in hardware and software project development using necessary hardware skills and open-ended programming environments to deliver a quality product in multidisciplinary domain.

PSO3. Successful career and Entrepreneurship: An ability to employ modern technology and software platforms in creating innovative career paths in Industry, as an Entrepreneur and a zest for higher studies.

PSO4.Research and Development: An ability to undertake research for the development of new ideas, technology and Engineering solutions for societal benefit.

II. 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 studentto 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%
Total			**100%**

JJ. Syllabus

Module 1: Introduction to an embedded systems design & RTOS:

Introduction to Embedded system, Processor in the System, Microcontroller, Memory Devices, Embedded System Project Management, ESD and Co-design issues in System development Process, Design cycle in the development phase for an embedded system, Use of target system or its emulator and In-circuit emulator, Use of software tools for development of an ES.Inter-process Communication and Synchronization of Processes, Tasks and Threads, Problem of Sharing Data by Multiple Tasks, Real Time Operating Systems: OS Services, I/O Subsystems, Interrupt Routines in RTOS Environment, RTOS Task Scheduling model, Interrupt Latency and Response times of the tasks.

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Module II: Overview of Microcontroller:

Microcontroller and Embedded Processors, Overview of 8051 Microcontroller family: Architecture, basic assembly language programming concepts, The program Counter and ROM Spaces in the 8051, Data types, 8051 Flag Bits ad PSW Register, 8051 Register Banks and Stack Instruction set, Loop and Jump Instructions, Call Instructions, Time delay generations and calculations, I/O port programming Addressing Modes, accessing memory using various addressing modes, Arithmetic instructions and programs, Logical instructions, BCD and ASCII application programs, Single-bit instruction programming, Reading input pins vs. port Latch, Programming of 8051 Timers, Counter Programming.

Module III: Communication with 8051:

Basics of Communication, Overview of RS-232, I2C Bus, UART, USB, IEEE 488 (GPIB). Parallel input output applications. (Stepper motor Sequencer program, Strobed input/output). Interrupt driven applications (real time clock, serial input/output with interrupt). Analog-digital interfacing (Pulse width modulator, 8-bit ADC).

Module IV: Basics of 8051 C Programming:

Introduction to 8051 C, 8051 memory constitution, Constants, variables and data types. Arrays structures and unions, pointers, Loops and decisions, Functions, Modules and programs.

Module V: 8051 C Programming:

Data interface, Timer control, Interrupt operations, Digital operations, A/D and D/A conversions, Common control problem examples (Centronics parallel interface, Printer interace, Memory access, Key matrix scanning, Stepper motor control and digital clock)

.

KK. 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

LL. Suggested Text/Reference Books:

- Raj Kamal, 2004, "Embedded Systems", TMH.
- James W. Stewart and Kai X. Miao, 2en Edition. "The 8051 microcontroller" Pearson Edu. Prentice Hall.
- M.A. Mazidi and J. G. Mazidi, 2004 "The 8051 Microcontroller and Embedded Systems", PHI.
- David E. Simon,1999, "An Embedded Software Primer", Pearson Education
- K.J. Ayala, 1991, "The 8051 Microcontroller", Penram International.
- Dr. Rajiv Kapadia, "8051 Microcontroller & Embedded Systems", Jaico Press
- Dr. Prasad, 2004, "Embedded Real Time System", Wiley Dreamtech.

MM. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO

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1	Introduction to Embedded system, Processor in the System, Microcontroller	Lecture	ECE 803.1	Mid Term-1, Quiz & End Sem Exam
2	Memory Devices, Embedded System Project Management, ESD and Co-design issues in System development Process	Lecture	ECE 803.1	Mid Term-1, Quiz & End Sem Exam
3	Design cycle in the development phase for an embedded system, Use of target system or its emulator and In-circuit emulator	Lecture	ECE 803.1	Mid Term-1, Quiz & End Sem Exam
4	Use of software tools for development of an ES.Inter-process Communication and Synchronization of Processes	Lecture	ECE 803.1	Mid Term-1, Quiz & End Sem Exam
5	Tasks and Threads, Problem of Sharing Data by Multiple Tasks, Real Time Operating Systems: OS Services	Lecture	ECE 803.1	Mid Term-1, Quiz & End Sem Exam
6	I/O Subsystems, Interrupt Routines in RTOS Environment	Lecture	ECE 803.1	Mid Term-1, Quiz & End Sem Exam
7	RTOS Task Scheduling model, Interrupt Latency and Response times of the tasks	Lecture	ECE 803.1	Mid Term-1, Quiz & End Sem Exam
8	Microcontroller and Embedded Processors, Overview of 8051 Microcontroller family: Architecture, basic assembly language programming concepts	Lecture	ECE 803.2	Mid Term-1, Quiz & End Sem Exam
9	The program Counter and ROM Spaces in the 8051, Data types, 8051 Flag Bits ad PSW Register	Lecture	ECE 803.2	Mid Term-1, Quiz & End Sem Exam
10	8051 Register Banks and Stack Instruction set, Loop and Jump Instructions, Call Instructions, Time delay generations and calculations	Lecture	ECE 803.2	Mid Term-1, Quiz & End Sem Exam

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11	I/O port programming Addressing Modes, accessing memory using various addressing modes, Arithmetic instructions and programs	Lecture	ECE 803.2	Mid Term-1, Quiz & End Sem Exam
12	Logical instructions, BCD and ASCII application programs	Lecture	ECE 803.2	Mid Term-1, Quiz & End Sem Exam
13	Single-bit instruction programming, Reading input pins vs. port Latch	Lecture	ECE 803.2	Mid Term-1, Quiz & End Sem Exam
14	Programming of 8051 Timers, Counter Programming	Lecture	ECE 803.2	Mid Term-1, Quiz & End Sem Exam
15	Basics of Communication, Overview of RS-232	Lecture	ECE 803.3	Mid Term-1, Quiz & End Sem Exam
16	I2C Bus, UART, USB, IEEE 488 (GPIB)	Lecture	ECE 803.3	Mid Term-1, Quiz & End Sem Exam
17	Parallel input output applications. (Stepper motor Sequencer program, Strobed input/output)	Lecture	ECE 803.3	Mid Term-1, Quiz & End Sem Exam
18	Interrupt driven applications (real time clock, serial input/output with interrupt)	Lecture	ECE 803.3	Mid Term-1, Quiz & End Sem Exam
19	Analog-digital interfacing (Pulse width modulator, 8-bit ADC)	Lecture	ECE 803.3	Mid Term-1, Quiz& End Sem Exam
20	Analog-digital interfacing (Pulse width modulator, 8-bit ADC)	Lecture	ECE 803.3	Mid Term-1, Quiz & End Sem Exam
21	Introduction to 8051 C	Lecture	ECE 803.4	Mid Term-2, Quiz & End Sem Exam
22	8051 memory constitution, Constants	Lecture	ECE 803.4	Mid Term-2, Quiz & End Sem Exam
23	Variables and data types.	Lecture	ECE 803.4	Mid Term-2, Quiz & End Sem Exam
24	Arrays structures and unions, pointers	Lecture	ECE 803.4	Mid Term-2, Quiz & End Sem Exam

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25	Loops and decisions	Lecture	ECE 803.4	Mid Term-2, Quiz & End Sem Exam
26	Functions, Modules and programs	Lecture	ECE 803.4	Mid Term-2, Quiz & End Sem Exam
27	Data interface, Timer control	Lecture	ECE 803.5	Mid Term-2, Quiz & End Sem Exam
28	Interrupt operations, Digital operations	Lecture	ECE 803.5	Mid Term-2, Quiz & End Sem Exam
29	Interrupt operations, Digital operations	Lecture	ECE 803.5	Mid Term-2, Quiz & End Sem Exam
30	A/D and D/A conversions	Lecture	ECE 803.5	Mid Term-2, Quiz & End Sem Exam
31	Common control problem examples	Lecture	ECE 803.5	Mid Term-2, Quiz & End Sem Exam
32	Centronics parallel interface, Printer interace	Lecture	ECE 803.5	Mid Term-2, Quiz & End Sem Exam
33	Memory access	Lecture	ECE 803.5	Mid Term-2, Quiz & End Sem Exam
34	Key matrix scanning	Lecture	ECE 803.5	Mid Term-2, Quiz & End Sem Exam
35	Stepper motor control	Lecture	ECE 803.5	Mid Term-2, Quiz & End Sem Exam
36	Digital clock	Lecture	ECE 803.5	Mid Term-2, Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4

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ECE803.1	Suggest design approach using advanced controllers to real-life situations.	3	3	1	3	1				2		2	1				
ECE803.2	Design interfacing of the systems with other data handling / processing systems	3	2	2	2	2				2		1	1				
ECE803.3	Appreciate engineering constraints like energy dissipation, data exchange speeds etc	3	2	2	2	2				3		3	1				

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering I MID-SEMESTER (SEM –VIII) 2023-24						
Class: B.Tech.(ECE) VIII Semester						
Subject Name: ECE 803 Embedded System		Time: 1.5 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		
Student will be able to **CO1:** Suggest design approach using advanced controllers to real-life situations. **CO2:** Design interfacing of the systems with other data handling / processing systems. **CO:3** Appreciate engineering constraints like energy dissipation, data exchange speeds etc.						

CO Map	Question No.	Question	Marks
CO1	Q.1	Explain the role of memory in microcontroller.	3
CO1	Q.2a	Discuss design cycle in the development phase for an embedded system	3

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	Q.2b	Explain RTOS with neat diagram	3
CO1	Q.3	What are the ways to store 128 byte RAM Data	6
CO2	Q.4	Explain the operation of 8051 Register Banks of 8051 microcontroller	3
CO2	Q.5a	Explain the logical bit instruction available in 8051	3
	Q.5b	What are Interrupt driven applications in 8051 microcontroller	3
CO3	Q 6	Write the function of DDRAM also write the important subroutine	6

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

ECE803							
EMBEDDED SYSTEMS							
Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U3G3
100	30	70	A+	10	3	3	30
100	30	70	B+	7	3	3	21
100	30	70	C+	4	3	3	12
100	30	70	A-	8	3	3	24
100	30	70	B-	5	3	3	15
100	30	70	B	6	3	3	18
Total No. of Students			=	6			
Total No. of Students			>60% marks	2	33.33333		
Attainment Level					Level 1		

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MADHYA PRADESH

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

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
Course Handout
Course : RADAR AND SATELLITE COMMUNICATIONS LAB
Course Code : ECE 822, Crédits : 01, Session :2023-24 (Even Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Shally Goyal

A. Introduction: The course intends builds basic knowledge of different types of Radar systems and satellite communication along with link designing & application. It also covers different modulation schemes & channels used.

B. Course Outcomes: At the end of the course the students can able to

ECE 822.1 implement the AM Transmitter, FM Transmitter, AM Receiver, FM Receiver, Remote Control etc.

ECE 822.2 Implement Wireless Mic System and RF portion of satellite receiver.

C. Programme Outcomes:

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4] Conduct investigations of complex problems: Use research-based knowledge and research

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methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **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

D. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to apply the knowledge to understand, analyze and develop complex Engineering solutions in the field of Electronic Devices, Electronics Networks, Analog and Digital circuits, and Telecommunication Communication networks.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in hardware and software project development using necessary hardware skills and open-ended programming environments to deliver a quality product in multidisciplinary domain.

PSO3. Successful career and Entrepreneurship: An ability to employ modern technology and software platforms in creating innovative career paths in Industry, as an Entrepreneur and a zest for higher studies.

PSO4.Research and Development: An ability to undertake research for the development of new ideas, technology and Engineering solutions for societal benefit.

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E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %

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Continuous Internal Evaluation	Lab Record	LR	10%
	Performance	P	10%
	Viva-Voce	V	5%
Attendance	A minimum of 75% Attendance is required to be maintained by a studentto 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%
Total			**100%**

F. Syllabus

List of experiments:

1. To study AM transmitter and receiver.
2. To study FM transmitter and receiver.
3. To implement the following circuits.
   - AM Transmitter
   - FM Transmitter
   - AM Receiver
   - FM Receiver
   - Remote Control
   - Wireless Mic System
4. To study RF portion of satellite receiver.
   - Study of dish antenna and section N.B section
   - Study of tuner
   - Study of R.F modulator section
5. To study the base-band portion of satellite receiver.
   - study of video section
   - study of sound section
   - study of signal indictor
   - study of power supply section

G. Examination Scheme:

	IA				EE	
Components	**A**	**PR**	**LR**	**V**	**PR**	**V**
Weightage (%)	5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

H. Lecture Plan

Lecture	Topics	Mode of	Correspon ding CO	Mode of Assessing CO

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		Delivery		
1	To study AM transmitter and receiver.	Practical	ECE 822.1	Mid Term-1, Assignment, PR, LR,VIVA
2	To study FM transmitter and receiver.	Practical	ECE 822.1	Mid Term-1, Assignment, PR, LR, VIVA
3	To implement the following circuits. - AM Transmitter - FM Transmitter - AM Receiver	Practical	ECE 822.1	Mid Term-1, Assignment, PR, LR, VIVA
4	To implement the following circuits. - FM Receiver - Remote Control - Wireless Mic System	Practical	ECE 822.2	Mid Term-1, Assignment, PR, LR, VIVA
5	To study RF portion of satellite receiver. - Study of dish antenna and section N.B section -	Practical	ECE 822.2	Mid Term-1, Assignment, PR, LR, VIVA
6	To study RF portion of satellite receiver. - Study of tuner	Practical	ECE 822.2	Mid Term-1, Assignment, PR, LR, VIVA
7	To study RF portion of satellite receiver. - Study of R.F modulator section	Practical	ECE 822.2	Mid Term-1, Assignment, PR, LR, VIVA
8	To study the base-band portion of satellite receiver. - study of video section - study of sound section -	Practical	ECE 822.2	Mid Term-1, Assignment, PR, LR, VIVA
9	To study the base-band portion of satellite receiver. - study of sound section - study of signal indictor	Practical	ECE 822.2	Mid Term-1, Assignment, PR, LR, VIVA
10	To study the base-band portion of satellite receiver - study of power supply	Practical	ECE 822.2	Mid Term-1, Assignment, PR, LR, VIVA

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	section			

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
ECE 822.1	implement the AM Transmitter, FM Transmitter, AM Receiver, FM Receiver, Remote Control etc.	2	2	2	2	1	1	-	-	-	2	2	2	**2**	**2**	**2**	**2**
ECE 822.2	Implement Wireless Mic System and RF portion of satellite receiver.	**2**	2	2	1	-	-	-	-	-	1	1	1	**2**	**2**	**2**	**1**

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Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering MID-SEMESTER (SEM –VIII) 2023-24						
Class: B.Tech.(ECE) VIII Semester						
Subject Name: ECE 822 RADAR AND SATELLITE COMMUNICATIONS LAB		Time: 2 Hrs			Max. Marks: 30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1, 2	Q.1, 2	Q.1, 2	Q.1, 2	Q.1, 2	Q.1, 2
Student will be able to attain CO1 to 3						

CO Map	Question No.	Question	Marks
CO1-2	Q.1	To study FM transmitter and receiver.	15
CO1-2	Q 2	To study RF portion of satellite receiver. - Study of tuner	15

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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ECE822							
RADAR & SATELLITE COMMUNICATIONS LAB							
Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U6G6
100	30	70	A+	10	1	1	10
100	30	70	A	9	1	1	9
100	30	70	A	9	1	1	9
100	30	70	A	9	1	1	9
100	30	70	B+	7	1	1	7
100	30	70	A-	8	1	1	8
Total No. of Students			=	6			
Total No. of Students			>60% marks	5	83.33333		
Attainment Level					Level 3		

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

Course Code : ECE 825, Crédits : 01, Session :2022-23 (Even Sem.), Class : B.Tech. 4th Year

Faculty Name : Dr. Narendra Kumar Garg

OO. Introduction: To provide the concept of modeling of Combinational and sequential circuits using VHDL and writing a code. To provide basic knowledge of how digital building blocks are described in VHDL..

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

BTE 825.1. Write a Verilog code for various combinational and sequential circuits..

BTE 825.2. Testing of Various digital designs using test bench in Verilog.

QQ. Programme Outcomes:

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[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modernengineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leaderin a team, to manage projects and in multidisciplinary environments

[PO.12]. **Life-long learning**: Recognize the need for, and have the preparation and

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ability to engage inindependent and life-long learning in the broadest context of technological change

RR. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to apply the knowledge to understand, analyze and develop complex Engineering solutions in the field of Electronic Devices, Electronics Networks, Analog and Digital circuits, and Telecommunication Communication networks.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in hardware and software project development using necessary hardware skills and open-ended programming environments to deliver a quality product in multidisciplinary domain.

PSO3. Successful career and Entrepreneurship: An ability to employ modern technology and software platforms in creating innovative career paths in Industry, as an Entrepreneur and a zest for higher studies.

PSO4.Research and Development: An ability to undertake research for the development of new ideas, technology and Engineering solutions for societal benefit.

SS. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term Viva	CT	15%
	Mid Term Performance		
	Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a studentto 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 Practical Examination	EE	70%
Total			**100%**

TT. Course Contents:

1. Basic and universal gates with 2, 3, 4 inputs and testing their simulation with signals.
2. Code for combinational circuits like Half adder, full adder and full subtractor. Also trying out other simple combinatorial circuits like AOI, IOA, OAI.

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3. Code for Sequential circuit like D and T, flip-flops.
4. JK and SR flip-flops.
5. 2 to 4 and 3 to 8 decoders.
6. 2 to 1, 4 to 1 and 8 to 1 multiplexers.
7. Simple register and shift register .
8. 2 to 1, 4 to 1 and 8 to 1 priority encoders, 9 input parity checker.
9. Four 8 bit three state drivers.
10. 1 bit, 4 bit 8 bit comparators.
11. Adding and subtracting 8 bit integers of various types.
12. Clock divider
13. Binary multipliers, Pulse counters.
14. Verilog HDLL Design examples of Moore machine, Mealy machine, generic gate inputs and delays.
15. Verilog HDL code examples of structural modeling showing binding.

Examination Scheme:

	IA				EE	
Components	**A**	**PR**	**LR**	**V**	**PR**	**V**
Weightage (%)	5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

UU. Experiment Plan

Experiment	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Basic and universal gates with 2, 3, 4 inputs and testing their simulation with signals	Practical	BTE 825.1	Mid Term Viva-1, Quiz & End Sem Pect. Exam
2	Half adder, full adder and full subtractor. Also trying out other simple combinatorial circuits like AOI, IOA, OAI.	Practical	BTE 825.1	Mid Term Viva-1, Quiz & End Sem Pect. Exam
3	D and T, flip-flops, JK and SR flip-flops.	Practical	BTE 825.1	Mid Term Viva-1, Quiz & End

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				Sem Pect. Exam
4	2 to 4 and 3 to 8 decoders, 2 to 1, 4 to 1 and 8 to 1 multiplexers.	Practical	BTE 825.1	Mid Term Viva-1, Quiz & End Sem Pect. Exam
5	2 to 1, 4 to 2 and 8 to 3 priority encoders, 8 bit tri state drivers.	Practical	BTE 825.2	Mid Term Viva-2, Quiz & End Sem Pect. Exam
6	9 input parity checker.	Practical	BTE 825.2	Mid Term Viva-2, Quiz & End Sem Pect. Exam
7	1 bit, 4 bit 8 bit comparators.	Practical	BTE 825.2	Mid Term Viva-2, Quiz & End Sem Pect. Exam
8	Adding and subtracting 8 bit integers of various types.	Practical	BTE 825.2	Mid Term Viva-2, Quiz & End Sem Pect. Exam
9	Clock divider.	Practical	BTE 825.3	Mid Term Viva-3, Quiz & End Sem Pect. Exam
10	Shift register.	Practical	ECE 825.3	Mid Term Viva-3, Quiz & End Sem Pect. Exam
11	Verilog Design examples of Moore machine, Mealy machine, generic gate inputs and delays.	Practical	BTE 825.3	Mid Term Viva-3, Quiz & End Sem Pect. Exam
12	Verilog code examples of structural modeling showing binding.	Practical	BTE 825.3	Mid Term Viva-3, Quiz & End Sem Pect. Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
ECE825.1	Write a Verilog code for various combination	3	3	1	3	1				2		2	1		2	1	

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	al and sequential circuits.																
ECE825.2	Testing of Various digital designs using test bench in Verilog.	3	2	2	2	2				2		1	1	1			2

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering I MID-SEMESTER Viva (SEM –VIII) 2023-24						
Class: B.Tech.(ECE) VIII Semester						
Subject Name: BTE 825 Verilog Programming Lab		Time: 2 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		
Student will be able to CO1: Write a Verilog code for various combinational and sequential circuits. CO2: Testing of Various digital designs using test bench in Verilog.						

CO Map	Question No.	Question	Marks
CO1	Q.1		2
CO1	Q.2a		2
	Q.2b		3
CO1	Q.3		3
CO2	Q.4		3
CO2	Q.5a		3
	Q.5b		3
CO2	Q.6		3

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CO3	Q.7a		3
CO3	Q.7b		3
CO3	Q.8		2

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

ECE824							
VHDL PROGRAMMING LAB							
Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U7G7
100	30	70	A+	10	1	1	10
100	30	70	A	9	1	1	9
100	30	70	A	9	1	1	9
100	30	70	A	9	1	1	9
100	30	70	A	9	1	1	9
100	30	70	A	9	1	1	9
Total No. of Students			=	6			
Total No. of Students			>60% marks	6	100		
Attainment Level					Level 3		

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AMITY SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

Programme Educational Objectives

B. Tech (Civil Engineering)

Graduates of the programme B Tech (Civil Engineering) will

PEO 1: Gain knowledge and skills in Civil engineering which will enable them to have a career and professional accomplishment in the public or private sector organizations

PEO 2: Become consultants on complex real life Civil Engineering problems related to Infrastructure development especially housing, construction, water supply, sewerage, transport, spatial planning.

PEO 3: Become entrepreneurs and develop processes and technologies to meet desired infrastructure needs of society and formulate solutions that are technically sound, Economically feasible, and socially acceptable.

PEO 4: Perform investigation for solving Civil Engineering problems by conducting research using modern equipment and software tools.

PEO 5: Function in multi-disciplinary teams and advocate policies, systems, processes and equipment to support civil engineering

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AMITY SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Bachelor of Technology (B. Tech.) CE

Academic Year – 2023-24

Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

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PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. 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.

Programme Specific Outcomes

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

PROGRAMMEARTICULATIONMATRIX

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ISEM	MAT101	3	2	3	3	3	-	-	-	2	-	2	3	-	-	-
	CHE101	3	3	3	3	-	3	3	3	3	3	3	-	-	-	-
	CSE104	3	3	3	2	-	-	-	-	-	-	-	-	3	3	3
	BME101	3	2	2	-	-	-	-	-	-	-	-	-	3	-	2
	CIV101	3	2	2	2	-		-	-	1	1	1	-	2	-	-
	CHE121	3	3	2	-	-	-	-	-	-	-	-	-	3	-	2
	CSE124	3	3	3	2	-	-	-	-	-	-	-	-	3	3	3
	BME121	3	2	2	-	-	-	-	-	-	-	-	-	3	-	2
	BCU141	3	2	2	2	-		-	-	1	1	1	-	2	-	-
	EVS142	3	3	2	-	-	-	-	-	-	-	-	-	3	-	2
	BSU143	3	3	2	-	-	-	-	-	-	-	-	-	3	-	2
	FLU144	3	3	3	2	-	-	-	-	-	-	-	-	3	3	3
ISEM	MAT201	3	2	2	-	-	-	-	-	-	-	-	-	3	-	2
	PHY101	3	2	2	2	-		-	-	1	1	1	-	2	-	-
	ECE101	3	3	2	-	-	-	-	-	-	-	-	-	3	-	2
	CSE204	3	3	3	2	-	-	-	-	-	-	-	-	3	3	3
	BME102	3	2	2	-	2	-	-	3	2	-	-	-	3	-	2
	PHY121	3	2	2	-	2	-	-	3	2	-	-	-	3	-	2
	ECE121	3	2	2	-	-	-	1	-	-	-	-	-	3	-	2
	CSE224	3	2	2	-	2	-	1	-	-	-	-	-	3	-	2

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	BME122	3	2	2	-	2	-	-	3	2	-	-	-	3	-	2
	BCU241	3	2	2	-	2	-	1	3	2	-	1	-	3	-	2
	EVS242	3	2	2	1	2	-	-	3	2	-	2	-	3	-	2
	BSU243	3	2	2	-	-	-	-	-	-	-	-	-	3	-	2
	FLU244	3	2	2	-	2	-	1	-	-	-	-	-	3	-	2

PROGRAMME ARTICULATION MATRIX

2nd Year		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
III SEM	MAT 301	3	2	1	-	-	-	-	-	-	-	-	-	1	1	1
	CIV 302	3	3	3	2	-	-	-	-	-	-	-	-	3	3	3
	CIV 303	3	2	2	-	-	-	-	-	-	-	-	-	3	-	2
	CIV 308	3	2	2	2	-		-	-	1	1	1	-	2	-	-
	CIV 309	3	3	2	-	-	-	-	-	-	-	-	-	3	-	2
	BME 104	1	2	2	1	1	-	-	-	-	-	-	-	2	-	-
	ECE 307	3	3	2	-	-	-	-	-	-	-	-	-	3	-	2
	CIV 322	1	2	2	1	1	-	-	-	-	-	-	-	2	-	-
	ECE 327	3	2	2	-	-	-	-	-	-	-	-	-	3	-	2
IV SEM	CIV 401	3	2	2	-	2	-	-	3	2	-	-	-	3	-	2
	CIV 402	3	2	2	-	-	-	1	-	-	-	-	-	3	-	2
	CIV 403	3	2	2	-	2	-	1	-	-	-	-	-	3	-	2
	CIV 404	3	2	2	-	2	-	-	3	2	-	-	-	3	-	2
	CIV 405	3	2	2	-	2	-	1	3	2	-	1	-	3	-	2
	CIV 407	3	2	2	1	2	-	-	3	2	-	2	-	3	-	2
	ECE 407	3	2	2	-	-	-	-	-	-	-	-	-	3	-	2
	CIV 421	3	2	2	1	2	-	-	3	2	-	2	-	3	-	2
	CIV 422	3	2	2	1	2	-	-	3	2	-	2	-	3	-	2
	CIV 423	3	2	2	1	2	-	-	3	2	-	2	-	3	-	2
	CIV 424	3	2	2	1	2	-	-	3	2	-	2	-	3	-	2
	ECE 427	3	2	2	1	2	-	-	3	2	-	2	-	3	-	2

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PROGRAMME ARTICULATION MATRIX																
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
VSEM	CIV 501	3	3	2	3	-	2	-	-	-	-	3	-	3	3	3
	CIV 502	2	2	2	-	-	-	-	2	-	-	-	-	1	2	1
	CIV 503	3	3	1	2	-	3	-	3	-	-	1	-	3	2	2
	CIV 504	2	-	2	-	-	-	-	2	-	-	-	-	3	2	2
	CIV 505	3	3	3	2	-	1	-	-	-	-	-	-	3	3	3
	CIV 506	2	2	2	-	-	-	-	2	-	-	-	-	1	2	1
	CIV 507	3	3	1	2	-	3	-	3	-	-	1	-	3	2	2
	CIV 522	3	3	2	3	-	2	-	-	-	-	3	-	3	3	3
	CIV 524	2	2	2	-	-	-	-	2	-	-	-	-	1	2	1
	CIV 527	3	3	1	2	-	3	-	3	-	-	1	-	3	2	2
	NPT550	3	2	1		-	2	-	-	-	-	1	-	3	3	3
VISE M	CIV 601	3	3	2	3	-	2	-	-	-	-	3	-	1	2	1
	CIV 602	2	2	2	-	-	-	-	2	-	-	-	-	3	2	2
	CIV 603	3	3	1	2	-	3	-	3	-	-	1	-	3	2	2
	CIV 604	2	2	2	-	-	-	-	2	-	-	-	-	3	3	3
	CIV 622	3	3	1	2	-	3	-	3	-	-	1	-	1	2	1
	CIV 623	2	-	2	-	-	-	-	2	-	-	-	-	3	2	2
	CIV 624	3	3	1	2	-	3	-	3	-	-	1	-	3	3	3
	CIV 605	2	2	2	-	-	-	-	2	-	-	-	-	1	2	1
	CIV 606	3	3	1	2	-	3	-	3	-	-	1	-	3	2	2
	CIV 607	3	3	1	2	-	3	-	3	-	-	1	-	3	2	2
	CIV 625	2	2	2	-	-	-	-	2	-	-	-	-	3	3	3
	CIV 626	3	3	1	2	-	3	-	3	-	-	1	-	1	2	1
	CIV 627	2	2	2	-	-	-	-	2	-	-	-	-	3	2	2
	NMP660	3	1	2	3	-	1	-	-	-	-	3	-	3	3	2

PROGRAMME ARTICULATION MATRIX																
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
VII SEM	CIV 701	3	3	2	3	3	2	2	-	3	2	3	3	3	3	3
	CIV 702	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1
	CIV 706	2	2	2	-	3	-	3	2	-	3	-	3	1	2	1
	CIV 722	3	3	2	3	3	2	2	-	3	2	3	3	3	3	3
	NPT 750	3	2	1		1	2	1	-	2	-	1	3	3	3	3
	NMP760	3	2	1		1	2	1	-	2	-	1	3	3	3	3
VIII SEM	CIV 801	3	3	2	3	3	2	2	-	3	2	3	3	1	2	1
	CIV 802	2	2	2	-	3	-	3	2	-	3	-	3	3	2	2
	CIV 803	3	3	1	2	3	3	3	3	3	-	1	3	3	2	2
	CIV 823	2	-	2	-	3	-	3	2	-	3	-	3	3	2	2
	NMP860	3	1	2	3	3	1	1	-	-	3	3	3	3	3	2

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AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : BASIC CIVIL ENGINEERING AND APPLIED MECHANICS
Course Code : CIV101, Crédits : 02, Session :2023-24(Odd Semester), Class : B.Tech. 1st Year
Faculty name : Dr. Mohan Kantharia, Mr. Sachin Tiwari

A. **Introduction:**The objective of this course is to understand the utility of various types of building materials and understand the location, construction detail and suitability of various building elements. It aims to determine the location of object on ground surface and to understand the effects of system of forces on rigid body in static conditions.

B. **Course Outcomes:**At the end of the course, students will be able to:
CIV101.1. Explain concepts and terminologies of building materials, surveying and mechanics.
CIV101.2. Apply various methods for surveying and mechanics.
CIV101.3. Determine the location, area and volume of objects on ground surface.
CIV101.4. Solve the problems of surveying and mechanics by using various methods.
CIV101.5. Analyse the effects of system of forces on rigid bodies in static conditions.

C. **Programme Outcomes:**
[PO.1].**Engineeringknowledge**:Applytheknowledgeofmathematics,science,engineeringfundamentals,andanengineeringspecializationtothesolutionofcomplexengineeringproblems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineeringproblems reaching substantiated conclusions using first principles of mathematics, natural sciences,andengineeringsciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and designsystem components or processes that meet the specified needs with appropriate consideration for thepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of theinformationtoprovidevalidconclusions

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[PO.5].**Moderntoolusage**:Create,select,andapplyappropriatetechniques,resources, andmodernengineering and IT tools including prediction and modeling to complex engineering activities with anunderstandingofthelimitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to theprofessionalengineeringpractice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societalandenvironmentalcontexts,anddemonstratetheknowledgeof,andneedforsustainabledevelopment

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities andnorms oftheengineeringpractices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverseteams,andinmultidisciplinarysettings

[PO.10].**Communication**:Communicateeffectivelyoncomplexengineeringactivitieswiththeengineeringcommunity and with society at large, such as, being able to comprehend and write effective reports anddesigndocumentation,makeeffectivepresentations,andgiveandreceiveclearinstructions

[PO.11].**Projectmanagementandfinance**:Demonstrateknowledgeandunderstanding oftheengineeringandmanagementprinciplesandapplythesetoone'sownwork,asamemberandleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments

[PO.12].**Life-longlearning**:Recognizetheneedfor,andhavethepreparationandabilityto engageinindependent andlife-longlearninginthebroadestcontextoftechnologicalchange

D. **Programme Specific Outcomes:**

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. **Assessment Plan:**

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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 isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Building Materials:
Stones, bricks, cement, timber - types, properties, test & uses, Introduction of concrete properties & laboratory tests on concrete, curing of concrete and mortar materials.

Module II: Surveying & Positioning:
Introduction to surveying, survey stations, measurement of distances; conventional and EDM methods. Measurement of directions by different methods, measurement of elevations by different methods, reciprocal levelling.

Module III: Smart City:
Elements of smart city, role of experts of various discipline of engineering in the development of smart city. Concept of green buildings, including rainwater harvesting, non-conventional sources of energy. Smart transportation and drainage system.

Module IV: Forces and Equilibrium:
Graphical and analytical treatment of concurrent and non-concurrent coplanar forces, free body diagram. Force diagram and Bow's notations. Application of equilibrium concepts. Analysis of plane trusses, method of joints, method of Sections.

Module V: Centre of Gravity and moment of Inertia:
Centroid and centre of gravity, moment of inertia of composite section. Support reactions, shear force and bending moment diagram for cantilever & simply supported beam with concentrated, distributed load and Couple.

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G. 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

H. Suggested Text/Reference Books:

- Surveying, Vol. – 1, Punmia B.C., Laxmi Publications, 17th edition, 2016
- Building Material, B. C. Punmia, Laxmi Publications,2016
- A textbook of Engineering Mechanics, D. S. Kumar, Katsons Publications, 2013
- Basic Civil Engineering, S. Ramamrutam & R. Narayan, Dhanpat Rai Pub., 3rd edition, 2013
- Applied Mechanics, Prasad I.B., Khanna Publication 17th edition, 1996
- Surveying, Duggal, Tata McGraw Hill New Delhi, 4th edition, 2013
- Engineering Mechanics - Statics & Dynamics, R.C. Hibbler, Pearson Publications, 14th edition, 2015
- Engineering Mechanics - statics dynamics, A. Boresi & Schmidt, Cengage learning,1st edition, 2008.
- Applied Mechanics, R.K. Rajput, Laxmi Publications, 3rd edition, 2016

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	STONES AND BRICKS	Lecture	CIV101.1	Mid Term-1, Quiz & End Sem Exam
2	WOOD AND CEMENT	Lecture	CIV101.1	Mid Term-1, Quiz & End Sem Exam
3	MORTAR AND CONCRETE AGGREGATE	Lecture	CIV101.1	Mid Term-1, Quiz & End Sem Exam
4	TESTING AND PROPERTIES CEMENT	Lecture	CIV101.1	Mid Term-1, Quiz & End Sem Exam
5	USES AND TYPES CONCRETE	Lecture	CIV101.1	Mid Term-1, Quiz & End Sem Exam
6	SURVEY TYPES AND CHAIN	Lecture	CIV101.2	Mid Term-1, Quiz & End Sem Exam
7	COMPASS SURVEY	Lecture	CIV101.2	Mid Term-1, Quiz & End Sem Exam
8	LEVELLING	Lecture	CIV101.2	Mid Term-1, Quiz & End Sem Exam
9	EDM, GPS AND TOTAL STATION	Lecture	CIV101.2	Mid Term-1, Quiz & End Sem Exam
10	SMART CITIES INDICATORS	Lecture	CIV101.3	Mid Term-1, Quiz & End Sem Exam
11	RAINWATER HARVESTING	Lecture	CIV101.3	Mid Term-1, Quiz

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				& End Sem Exam
12	NON-CONVENTIONAL ENERGY SOURCES	Lecture	CIV101.3	Mid Term-1, Quiz & End Sem Exam
13	GREEN BUILDINGS	Lecture	CIV101.3	Mid Term-1, Quiz & End Sem Exam
14	FORCES AND MOMENTS	Lecture	CIV101.4	Mid Term-1, Quiz & End Sem Exam
15	LAMI'S THEOREM AND VARIGNON THEOREM	Lecture	CIV101.4	Mid Term-1, Quiz & End Sem Exam
16	COMPOSITION AND RESOLUTION OF FORCES	Lecture	CIV101.4	Mid Term-1, Quiz & End Sem Exam
17	SUPPORT REACTIONS	Lecture	CIV101.4	Mid Term-1, Quiz & End Sem Exam
18	TRUSSES	Lecture	CIV101.4	Mid Term-1, Quiz & End Sem Exam
19	CENTRE OF GRAVITY AND MOMENTS OF INERTIA	Lecture	CIV101.5	Mid Term-1, Quiz & End Sem Exam
20	PERPENDICULAR AXIS AND PARALLEL AXIS THEOREM	Lecture	CIV101.5	Mid Term-1, Quiz & End Sem Exam
21	TYPES OF LOADS, SUPPORTS, AND BEAM	Lecture	CIV101.5	Assignment, Quiz & End Sem Exam
22	SHEAR FORCE AND BENDIND MOMENT DIAGRAM	Lecture	CIV101.5	Assignment, Quiz & End Sem Exam
23	POINT LOADS SF AND BM	Lecture	CIV101.5	Assignment, Quiz & End Sem Exam
24	UDL SF AND BM	Lecture	CIV101.5	Assignment, Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV101.1	Explain concepts and terminologies of building materials, surveying and mechanics.	3	3	1	3	1	-	-	-	2		2	1			

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CIV101.2	Apply various methods for surveying and mechanics.	3	2	2	2	2	-	-	-	2		1	1			
CIV101.3	Determine the location, area and volume of objects on ground surface.	3	2	2	2	2				3		3	1			
CIV101.4	Solve the problems of surveying and mechanics by using various methods.	3	3	2	3	2				1		2	1			
CIV101.5	Analyse the effects of system of forces on rigid bodies in static conditions.	2	2	1	2	3				2		2	1			

ampleQuestionPaper

Amity School of Engineering and Technology DepartmentofCivilEngineering IMID-SEMESTER(SEM– I)2023-24						
Class:B.Tech.(Civil) ISemester						
SubjectName: CIV101 Basic Civil Engineering and Applied Mechanics		Time:2 Hrs			Max.Marks:30	
Levels of thequestions as perBloomsTaxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
QuestionMapping	Q.1,2	Q.3,4,5	Q.6			
Student willbeableto **CO1**. Explain concepts and terminologies of building materials, surveying and mechanics. **CO2.** Apply various methods for surveying and mechanics. **CO3.**Determine the location, area and volume of objects on ground surface.						

COMap	QuestionNo.	Question	Marks
CO1	Q.1	Describe Green buildings as futuristic buildings.	3

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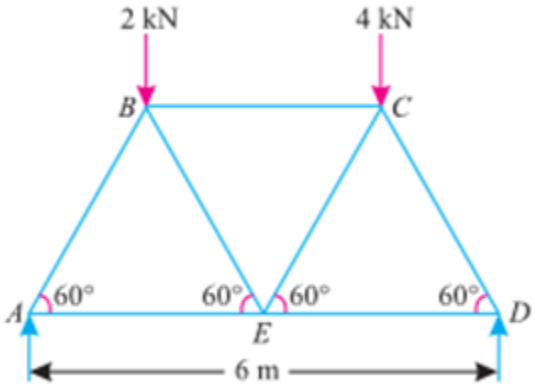
CO1	Q.2a	State law of parallelogram law of forces and prove it .	3
	Q.2b	What is the meaning of resultant and equilibrant, show in examples.	3
CO2	Q.3	Each member of the truss is 3meter length. The truss is freely supported at its end points. At points B and C forces 2kN and 4kN are applied respectively. Find the forces in all the members of the truss. Also indicate whether the forces compressive or tensile in nature. 	6
CO2	Q.4	What do you understand by composition and resolution of forces?	3
CO3	Q.5a	What are the characteristics of good building stone?	3
	Q.5b	Convert the following whole circle bearings to quadrantal bearings. (a) 350^0 10’ (b) 225^0 30’ (c) 120°30’ (d) 50° 15’	3
CO3	Q6	Find the moment of inertia of the lamina with a circular hole of 30 mm diameter about the axis AB as shown in the figure.	6

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		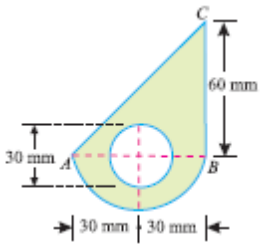	

Attainments		Rubric
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

Amity University Madhya Pradesh
B.Tech (Civil Engineering)
2023-2027
Exam Result For (Semester) : I
Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	CIV101 BASIC CIVIL ENGINEERING & APPLIED MECHANICS							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U6G6
1	A60215823002	Mr KAVYANSH SINGH	100	30	70	B+	7	2	2	14
2	A60215823001	Mr MOHIT SINGH RAJAWAT	100	30	70	B-	5	2	2	10
3	A60215823005	Mr SHIVAM KUMAR	100	30	70	B-	5	2	2	10
4	A60215823006	Mr PRASHANT TOMAR	100	30	70	B+	7	2	2	14
5	A60215823008	Mr DEV ARYAN PUROHIT	100	30	70	C+	4	2	2	8
			Total No. of Students			=	5			
			Total No. of Students			>60% marks	0	0.00	%	
			Attainment Level					-		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **COMPUTER-AIDED CIVIL ENGINEERING DRAWING**
Course Code : CIV 302, Crédits : 03, Session : 2023-24 (Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Khantharia

A. Introduction

The objective of the course is to develop the capability for carrying out independent design. Information in the form of sketch and images to be illustrated as a part of discussion.

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

- **CIV302.1**. Applying software's in design and drawings of Civil Engineering structures.
- **CIV302.2**. Able to proficiency, including the ability to use industry-standard computer software to generate 2D and 3D drawings.
- **CIV302.3**. Understanding of the theory of orthographic projection and the conventions associated with Civil engineering drawings.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. 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.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D.

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 isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

E. Course Content

F. Module I: Basics of Auto Cad (2-D) and Auto Cad (3-D): Two-dimensional drafting work to be handled in detail on Auto Cad. Complete Drafting, Editing and modification work to be done and presentations

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be made.Basic commands and usage of 3d Auto Cad drawing. Drafting basic geometrical forms and combinations of the same in three dimensions and their editing.

Module II: Elements of Building Drawing: Symbols and sing Conventions used for materials, plumbing, rebar drawing, electrical fittings. Masonry Bonds details, one brick wall and one and half brick wall, wall connections, . RCC beam, column, footings, foundation plan, load wearing wall.

Module III:Building Drawing: Detail drawing of single story building Plan, Elevation, Sectional Elevation. Standard fittings, drawings of different types of buildings. .

Module IV: Building Bye-laws: Building Planning – Provisions of National Building Code, open area,setbacks, FAR terminology, principles of planning, orientation. site selection, types of drawings. Types of buildings. Classification of structure, Load bearing structure, Framed structure, Composite structure.

Module V: Perspective Drawing: Elements of perspective drawing involving simple problems, one point and two point perspectives.

G. 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; Att: Attendance

H. Suggested Books

- Building Drawing Shah M. G. Kale C. M, Tata McGraw-Hill Education
- Planning & Designing of Building Sane Y. S, Allies Book Stall
- Architectural Design Ernest Pickering, J. Wiley & Sons
- National Building Code-2005

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Two-dimensional drafting work to be handled in detail on Auto Cad.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
2	Complete Drafting.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
3	Basic commands and usage of 3d Auto Cad drawing	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
4	Drafting basic geometrical forms	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
5	combinations of the same in three dimensions and their editing.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
6	Editing and modification work to be done and	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam

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	presentations be made.			
7	Symbols and sing Conventions used for materials,., , .	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
8	plumbing, rebar drawing, electrical fittings.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
9	plumbing, rebar drawing, electrical fittings.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
10	Masonry Bonds details, one brick wall and one and half brick wall.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
11	Masonry Bonds details, one brick wall and one and half brick wall.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
12	wall connections.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
13	RCC beam.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
14	Rcc column, footings.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
15	Foundation plan, load Bearing wall.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
16	Detail drawing of single story building Plan,	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
17	Elevation, of buildings	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
18	Sectional Elevation.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
19	Standard fittings.	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
20	Drawings of different types of buildings	Lecture	CIV 302.1	Mid Term-1, Quiz & End Sem Exam
21	Building Planning Types of buildings.	Lecture	CIV 302.1	Assignment, Quiz & End Sem Exam
22	Provisions of National Building Code.	Lecture	CIV 302.1	Assignment, Quiz & End Sem Exam
23	Provisions of National Building Code.	Lecture	CIV 302.1	Assignment, Quiz & End Sem Exam
24	Open area,setbacks	Lecture	CIV 302.1	Assignment, Quiz & End Sem Exam
25	FAR terminology	Lecture	CIV 302.1	Assignment, Quiz & End Sem Exam
26	Principles of planning, orientation	Lecture	CIV 302.1	Assignment, Quiz & End Sem Exam
27	Site selection, types of drawings.	Lecture	CIV 302.1	Assignment, Quiz & End Sem Exam

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28	*Classification of structure, Load bearing structure,*	Lecture	CIV 302.1	Assignment, Quiz & End Sem Exam
29	Framed structure, Composite structure.	Lecture	CIV 302.1	Assignment, Quiz & End Sem Exam
30	Elements of perspective drawing involving simple problems, one point and two point perspectives.	Lecture	CIV 302.1	Assignment, Quiz & End Sem Exam
31	Elements of perspective drawing involving simple problems, one point and two point perspectives.	Lecture	CIV 302.1	Assignment, Quiz & End Sem Exam
32	Elements of perspective drawing involving simple problems, one point and two point perspectives. Elements of perspective drawing involving simple problems, one point and two point perspectives.	Lecture	CIV 302.1	Assignment, Quiz & End Sem Exam
33	Elements of perspective drawing involving simple problems, one point and two point perspectives.	Lecture	CIV 302.1	Assignment, Quiz & End Sem Exam
34	Elements of perspective drawing involving simple problems, one point and two point perspectives.	Lecture	CIV 302.1	Assignment, Quiz & End Sem Exam
35	Elements of perspective drawing involving simple problems, one point and two point perspectives.	Lecture	CIV 302.1	Assignment, Quiz & End Sem Exam
36	Elements of perspective drawing involving simple problems, one point and two point perspectives.	Lecture	CIV 302.1	Assignment, Quiz & End Sem Exam

J.

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES	CORRELATION WITH PROGRAMME SPECIFIC

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														OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV302.1	Application of software's in design and drawings of Civil Engineering structures.	3	3	1	3	1				2		2	1			
CIV302.2	Able to proficiency, including the ability to use industry-standard computer software to generate 2D and 3D drawings	3	2	2	2	2				2		1	1			
CIV302.3	Understanding of the theory of orthographic projection and the conventions associated with Civil engineering drawings.	3	2	2	2	2				3		3	1			

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–III)2023-24						
Class: B.Tech (CE) 3rd Semester						
Subjec tName: CIV 302 Computer Aided Civil Engg drawing		Time:1.5Hrs		Max.Marks:30		
Levels of thequestions as perBloomsTaxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

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Student will be able to
CO1: Using the software for the design of buildings, making plans.
CO2: Applying the basic concept of drawing
CO3: Understanding the various projections.

COMap	QuestionNo.	Question	Marks
CO1	Q.1	Use Auto CADD to make 2-D plan of building	3
CO1	Q.2a	What are various software used for the design of building.	3
	Q.2b	Write down various commands in Auto-CADD	3
CO1	Q.3	What is use of line command ?	6
CO2	Q.4	Discuss various types of projections.	3
CO2	Q.5a	Draw orthographic projections.	3
	Q.5b	Discuss various types of elements of building drawing.	3
CO3	Q6	What do you mean by 2-d and 3-d projections.	6

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

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Amity University Madhya Pradesh
B.Tech (Civil Engineering)
2022-2026
Exam Result For (Semester) : III
Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	CIV302 COMPUTER-AIDED CIVIL ENGINEERING DRAWING							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U12G12
1	A60215822002	Mr ADITYA BHADOURIYA	100	30	70	B	6	3	3	18
2	A60215822001	Mr RISHAV KUMAR	100	30	70	A	9	3	3	27
3	A60215822004	Mr SANSKAR SHARMA	100	30	70	B-	5	3	3	15
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	1	33.33	%	
			Attainment Level					-		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **ENGINEERING MECHANICS**
Course Code : CIV 303, Credits : 04, Session : 2023-24(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Khantharia, Dr. Imran Ahmad Khan

A. Introduction

The course also covers the simple and compound stresses due to forces, stresses and deflection in beams due to bending, torsion in circular section, strain energy, different theories of failure, stress in thin cylinder thick cylinder and spheres due to external and internal pressure.

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

- **CIV303.1** Able to know the importance of seismic activity consideration in terrain.
- **CIV303.2** Able to understand various techniques to determine engineering properties of rocks and distinguish different types of rocks and minerals.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. 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.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

D.

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 isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

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E. **Module I: Introduction to Engineering Mechanics Covering:** Introduction to Engineering Mechanics covering, Force Systems Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy.

Module II:Centroid and Centre of Gravity Covering: Centroid and Centre of Gravity covering, Centroid of simple figures from first principle, centroid of composite sections; Centre of Gravity and its implications; Area moment of inertia- Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Mass moment inertia of circular plate, Cylinder, Cone, Sphere, Hook.

Module III: Basic Structural Analysis: Basic Structural Analysis covering, Equilibrium in three dimensions; Method of Sections; Method of Joints; How to determine if a member is in tension or compression; Simple Trusses; Zero force members; Beams & types of beams; Frames & Machines, Friction covering, Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, wedge friction, screw jack & differential screw jack;

Module IV: Virtual Work and Energy Method: Virtual Work and Energy Method- Virtual displacements, principle of virtual work for particle and ideal system of rigid bodies, degrees of freedom. Active force diagram, systems with friction, mechanical efficiency. Conservative forces and potential energy (elastic and gravitational), energy equation for equilibrium. Applications of energy method.

Module V: Review of Particle Kinematics, Dynamics and **Mechanical Vibrations:**Introduction to Kinematics of Rigid Bodies covering, Basic terms, general principles in dynamics; Types of motion, Instantaneous centre of rotation in plane motion and simple problems; D'Alembert's principle and its applications in plane motion and connected bodies; Work energy principle and its application in plane motion of connected bodies; Kinetics of rigid body rotation; Review of particle dynamics- Rectilinear motion; Plane curvilinear motion (rectangular, path, and polar coordinates). 3-D curvilinear motion; Relative and constrained motion; Newton's 2nd law (rectangular, path, and polar coordinates). Work-kinetic energy, power, potential energy. Impulse-momentum (linear, angular); Impact (Direct and oblique), Mechanical Vibrations covering, Basic terminology, free and forced vibrations, resonance and its effects; Degree of freedom; Derivation for frequency and amplitude of free vibrations without damping and single degree of freedom system, simple problems, types of pendulum, use of simple, compound and torsion pendulums.

F. Examination Scheme:

Components	A	CT	S/V/Q/ HA	EE

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Amity University Madhya Pradesh Gwalior

Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

G. Text Books

- Jindal U.C., "Strength of Materials", Galgotia Publication, New Delhi, 1998.
- Ryder G.H., "Strength of Materials", Macmillan, Delhi, 2003.
- R.K. Bansal, "Strength of Materials", Laxmi Publication, New Delhi, 2001.
- Sadhu Singh, "Strength of Materials", Khanna Publishers, New Delhi, 2000.
- Timoshenko S.P., "Elements of Strength of Materials", East-West affiliated, New Delhi, 2000.
- Hibbler R.C., "Mechanics of Materials", Prentice Hall, New Delhi, 1994.

H.

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction to Engineering Mechanics covering.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
2	Force Systems Basic concepts	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
3	Particle equilibrium in 2-D & 3-D.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
4	Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
5	Components in Space – Resultant- Moment of Forces and its Application.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
6	Couples and Resultant of Force System, Equilibrium of System of Forces	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
7	Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
8	Static Indeterminacy.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
9	Centroid and Centre of Gravity covering.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
10	Centroid of simple figures.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
11	from first principle, centroid of composite sections.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
12	Centre of Gravity and its implications.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
13	Area moment of inertia- Definition.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
14	Moment of inertia of plane sections from first principles.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
15	Theorems of moment of inertia.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam

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16	Moment of inertia of standard sections and composite sections	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
17	Mass moment inertia of circular plate, Cylinder,	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
18	Mass moment inertia Cone, Sphere, Hook.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
19	Basic Structural Analysis covering.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
20	Equilibrium in three dimensions.	Lecture	CIV303.1	Mid Term-1, Quiz & End Sem Exam
21	Method of Sections.	Lecture	CIV303.1	Assignment, Quiz & End Sem Exam
22	Method of Joints; How to determine if a member is in tension or compression	Lecture	CIV303.1	Assignment, Quiz & End Sem Exam
23	Simple Trusses; Zero force members.	Lecture	CIV303.1	Assignment, Quiz & End Sem Exam
24	Beams & types of beams; Frames & Machines	Lecture	CIV303.1	Assignment, Quiz & End Sem Exam
25	Friction covering, Types of friction, Limiting friction.	Lecture	CIV303.1	Assignment, Quiz & End Sem Exam
26	Friction, Static and Dynamic Friction	Lecture	CIV303.1	Assignment, Quiz & End Sem Exam
27	Laws of; Motion of Bodies, wedge friction.	Lecture	CIV303.1	Assignment, Quiz & End Sem Exam
28	screw jack & differential screw jack	Lecture	CIV303.1	Assignment, Quiz & End Sem Exam
29	Method of Joints; How to determine if a member is in tension.	Lecture	CIV303.1	Assignment, Quiz & End Sem Exam
30	Virtual Work and Energy Method-for. (	Lecture	CIV303.1	Assignment, Quiz & End Sem Exam
31	Virtual displacements, principle of virtual work.	Lecture	CIV303.1	Assignment, Quiz & End Sem Exam
32	particle and ideal system of rigid bodies.	Lecture	CIV303.1	Assignment, Quiz & End Sem Exam
33	degrees of freedom.	Lecture	CIV303.1	Assignment, Quiz & End Sem Exam
34	Active force diagram, systems with friction.	Lecture	CIV303.1	Assignment, Quiz & End Sem Exam
35	Mechanical efficiency. Conservative forces and potential energy.	Lecture	CIV303.1	Assignment, Quiz & End Sem Exam
36	Elastic and gravitational), energy equation for equilibrium. Applications of energy method.	Lecture	CIV303.1	Assignment, Quiz & End Sem Exam
37	Introduction to Kinematics of Rigid Bodies covering, Basic terms, general principles in dynamics.	Lecture	CIV303.1	Assignment, Quiz & End Sem Exam

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38	Mechanical Vibrations covering, Basic terminology, free and forced vibrations.	Lecture	CIV303.1	Assignment, Quiz & End Sem Exam
39	Resonance and its effects; Degree of freedom.	Lecture	CIV303.1	Assignment, Quiz & End Sem Exam
40	Derivation for frequency and amplitude of free vibrations without damping and single degree of freedom system.	Lecture	CIV303.1	Assignment, Quiz & End Sem Exam

I.

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV303.1	Able to know the importance of seismic activity consideration in terrain.	3	3	1	3	1				2		2	1			
CIV303.2	Able to understand various techniques to determine engineering properties of rocks and distinguish different types of rocks and minerals	3	2	2	2	2				2		1	1			

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–III)2023-24		
Class: B.Tech (CE) 3rd Semester		
Subject t Name:	Time:1.5Hrs	Max.Marks:30

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CIV 303 Engineering Mechanics						
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to
CO1: Understand the basic concept of stress and strain
CO2: Analyze the basic properties of different materials.

CO Map	Question No.	Question	Marks
CO1	Q.1	What is force and it system?	3
CO1	Q.2a	What is concurrent and coplanar forces?	3
	Q.2b	What do you mean by free body diagram?	3
CO1	Q.3	What is stress and strain?	6
CO2	Q.4	What is Kinetics of rigid body and also Review of particle dynamics.	3
CO2	Q.5a	What is centre of gravity.	3
	Q.5b	What is curvilinear motion, Relative and constrained motion.	3
CO2	Q6	What is Newton's 2nd law (rectangular, path, and polar coordinates).	6

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

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B.Tech (Civil Engineering)
2022-2026
Exam Result For (Semester) : III
Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	CIV303 ENGINEERING MECHANICS							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U5G5
1	A60215822002	Mr ADITYA BHADOURIYA	100	30	70	A	9	4	4	36
2	A60215822001	Mr RISHAV KUMAR	100	30	70	A	9	4	4	36
3	A60215822004	Mr SANSKAR SHARMA	100	30	70	A-	8	4	4	32
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	3	100.00	%	
			Attainment Level					Level 3		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **CIVIL ENGINEERING & ENERGY SCIENCE**
Course Code : CIV 308, Credits : 04, Session : 2023-24 (Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Khantharia, Mr. Sachin Tiwari

A. Introduction

Energy-efficient construction implies the development of energy-efficient technological and other measures that are aimed at streamlining the processes of using energy resources at all stages of construction. One of their effective directions is the construction of "green" buildings with zero energy consumption.

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

- **CIV 308.1** Understand the basics of ancient and modern architecture, modern construction and materials.
- **CIV 308.2** Analyze the difference between different types of energy sources their origin and usage.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. 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.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

D. Programme Specific Outcomes:

PSO1: Students will be able to understand the different types of construction ancient and modern in recent trends.

PSO2: Students will able to apply all the concepts to develop green construction and to use energy efficiently.

PSO3: It will help student to understand the different types of construction.

E.

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	A	5%

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	allowance of 25%includesalltypesofleaves Including medical leaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F.

Module I: Introduction: What is Civil Engineering/ Infrastructure? Basics of Engineering and Civil Engineering; Broad disciplines of Civil Engineering; Importance of Civil Engineering, Possible scopes for a career. Early constructions and developments over time; Ancient monuments & Modern marvels; Development of various materials of construction and methods of construction; Works of Eminent civil engineers. Introduction to Energy Science: Scientific principles and historical interpretation to place energy use in the context of pressing societal, environmental and climate issues**.**

Module II: Energy Sources: Overview of energy systems, sources, transformations, efficiency, and storage. Fossil fuels (coal, oil, oil-bearing shale and sands, coal gasification) - past, present & future, Remedies & alternatives for fossil fuels - biomass, wind, solar, nuclear, wave, tidal and hydrogen; Sustainability and environmental trade-offs of different energy systems; possibilities for energy storage or regeneration (Ex. Pumped storage hydro power projects, superconductor-based energy storages, high efficiency batteries)

Module III: Energy & Environment: Energy efficiency and conservation; introduction to clean energy technologies and its importance in sustainable development; Carbon footprint, energy consumption and sustainability; introduction to the economics of energy;; How future energy use can be influenced by economic, environmental, trade, and research policy.

Module IV: Civil Engineering Projects connected with the Energy Sources: Coal mining technologies, Oil exploration offshore platforms, Underground and under-sea oil pipelines, solar chimney project, wave energy caissons, coastal installations for tidal power, wind mill towers; hydro power stations above-ground and underground along with associated dams, tunnels, penstocks, etc.; Nuclear reactor; Spent Nuclear fuel storage and disposal systems.

Module V: Engineering for Energy Conservation: Concept of Green Building and Green Architecture; Green building concepts; LEED ratings. Energy Audit of Facilities and optimization of energy consumption**:** Aesthetics in Civil Engineering, Examples of great architecture, fundamentals of architectural design & town planning; Building Systems (HVAC, Acoustics, Lighting, etc.); LEED ratings; Development of Smart cities.

G.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; Att: Attendance

H. Suggested Books

- Patil, B.S.(1974), Legal Aspects of Building and Engineering Contract
- The National Building Code, BIS, (2017)
- RERA Act, (2017)
- Meena Rao (2006), Fundamental concepts in Law of Contract, 3rd Edn. Professional Offset

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- Chandiramani, Neelima (2000), The Law of Contract: An Outline, 2nd Edn. Avinash Publications Mumbai
- Boyle, Godfrey (2004), Renewable Energy (2nd edition). Oxford UniversityPress

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	What is Civil Engineering/ and Civil Engineering;	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
2	Infrastructure? Basics of Engineering	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
3	Broad disciplines of Civil Engineering.	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
4	Importance of Civil Engineering,	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
5	Early constructions and developments over time	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
6	Ancient monuments & Modern marvels	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
7	Development of various materials of construction and methods of construction	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
8	Works of Eminent civil engineers. Introduction to Energy Science	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
9	Scientific principles and historical interpretation to place energy use in the context of pressing societal	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
10	Environmental and climate issues.	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
11	Possible scopes for a career.	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
12	Overview of energy systems, and storage., coal gasification)	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
13	Overview of energy systems, sources, transformations, efficiency	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
14	Fossil fuels (coal, oil, oil-bearing shale and sands.	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
15	past, present & future, remedies & alternatives for fossil fuels	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
16	Biomass, wind, solar, nuclear, wave, tidal and hydrogen.	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
17	Sustainability and environmental trade-offs of different energy systems	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam

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18	possibilities for energy storage or regeneration (Ex. Pumped storage hydro power project	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
19	superconductor-based energy storages, high efficiency batteries)	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
20	Energy efficiency and conservation;, environmental,	Lecture	CIV308.1	Mid Term-1, Quiz & End Sem Exam
21	introduction to clean energy technologies	Lecture	CIV308.1	Assignment, Quiz & End Sem Exam
22	introduction to clean energy technologies and its importance in sustainable development	Lecture	CIV308.1	Assignment, Quiz & End Sem Exam
23	Carbon footprint, energy consumption and sustainability	Lecture	CIV308.1	Assignment, Quiz & End Sem Exam
24	introduction to the economics of energy	Lecture	CIV308.1	Assignment, Quiz & End Sem Exam
25	How future energy use can be influenced by economic	Lecture	CIV308.1	Assignment, Quiz & End Sem Exam
26	Trade, and research policy.	Lecture	CIV308.1	Assignment, Quiz & End Sem Exam
27	Coal mining technologies, Oil exploration offshore platforms, , solar,; tunnels, penstocks, etc.;	Lecture	CIV308.1	Assignment, Quiz & End Sem Exam
28	Underground and under-sea oil pipelines	Lecture	CIV308.1	Assignment, Quiz & End Sem Exam
29	chimney project, wave energy caissons	Lecture	CIV308.1	Assignment, Quiz & End Sem Exam
30	coastal installations for tidal power, wind mill towers	Lecture	CIV308.1	Assignment, Quiz & End Sem Exam
31	hydro power stations above-ground and underground along with associated dams,	Lecture	CIV308.1	Assignment, Quiz & End Sem Exam
32	Nuclear reactor; Spent Nuclear fuel storage and disposal systems.	Lecture	CIV308.1	Assignment, Quiz & End Sem Exam
33	Nuclear reactor; Spent Nuclear fuel storage and disposal systems.	Lecture	CIV308.1	Assignment, Quiz & End Sem Exam
34	Concept of Green Building and Green Architecture.:,	Lecture	CIV308.1	Assignment, Quiz & End Sem Exam
35	Green building concepts	Lecture	CIV308.1	Assignment, Quiz & End Sem Exam
36	LEED ratings	Lecture	CIV308.1	Assignment, Quiz & End Sem Exam
37	Energy Audit of Facilities and optimization of energy consumption	Lecture	CIV308.1	Assignment, Quiz & End Sem Exam
38	Aesthetics in Civil Engineering, Examples of great architecture	Lecture	CIV308.1	Assignment, Quiz & End Sem Exam
39	fundamentals of architectural design & town planning;	Lecture	CIV308.1	Assignment, Quiz &

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	Building Systems			End Sem Exam
40	(HVAC, Acoustics, Lighting, etc.); LEED ratings; Development of Smart cities.	Lecture	CIV308.1	Assignment, Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV308.1	Understand the basic concept of sustainable construction with different materials.	3	3	1	3	1				2		2	1		1	1
CIV308.2	Students will able to visualize the difference between ancient and modern construction.	3	2	2	2	2				2		1	1		2	1
CIV308.3	Understanding the basic of different structural components and their usage.	3	2	2	2	2				2		1	1		1	2

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–III)2023-24		
Class: B.Tech (CE) 3rd Semester		
Subjec tName: CIV 308 Civil Engg and Energy Sciences	Time:1.5Hrs	Max.Marks:30

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Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to
CO1: Understand the basic difference between modern and ancient constructions
CO2: Understand basic of different energy sources and their origin

CO Map	Question No.	Question	Marks
CO1	Q.1	What do you understand by modern construction materials?	3
CO1	Q.2a	What do you understand by cement?	3
	Q.2b	What are different types of construction materials?	3
CO1	Q.3	What do you mean by concrete?	6
CO2	Q.4	What are different conventional energy sources?	3
CO2	Q.5a	Discuss origin of fossil fuels and its use.	3
	Q.5b	Discuss tidal energy, solar energy and wind energy.	3
CO2	Q6	Discuss conventional and non conventional energy sources.	6

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

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Amity University Madhya Pradesh
B.Tech (Civil Engineering)
2022-2026
Exam Result For (Semester) : III
Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	CIV308 CIVIL ENGINEERING AND ENERGY SCIENCE							
			Max Marks	CE Weightage (%)	ET Weightage (%)	GO	GP	ACU	ECU	U14G14
1	A60215822002	Mr ADITYA BHADOURIYA	100	30	70	A	9	4	4	36
2	A60215822001	Mr RISHAV KUMAR	100	30	70	A+	10	4	4	40
3	A60215822004	Mr SANSKAR SHARMA	100	30	70	A	9	4	4	36
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	3	100.00	%	
			Attainment Level					Level 3		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **COMPUTER-AIDED CIVIL ENGINEERING DRAWING LAB**
Course Code : CIV 322, Credits : 01, Session : 2023-24(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Sachin Tiwari, Mr. Mohan Kantharia

A. Introduction

Engineering drawing, most commonly referred to as engineering graphics, is the art of manipulation of designs of a variety of components, especially those related to engineering.

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

- **CIV322.1**. Application of software's in design and drawings of Civil Engineering structures.
- **CIV322.2**. Able to proficiency, including the ability to use industry-standard computer software to generate 2D and 3D drawings
- **CIV322.3**. Understanding of the theory of orthographic projection and the conventions associated with Civil engineering drawings.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. 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.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

PSO2: Provide sustainable solutions to the Civil Engineering Problems

PSO3: It. will help students to analyze and Provide concrete solution to environmental problem

E.

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 isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves	A	5%

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	includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

- Basic of 2-D Auto CAD **(2 Hours)**
- Drawing of Elements of Buildings, column, beam, footings by 2-D Auto CAD**. (2 Hours)**
- Drawing of RCC Details by Auto CAD **(2 Hours)**
- Drawing of Residential Building, and school Building by Auto CAD. **(2 Hours**)
- Types of stair, RCC stair case, septic tank, Soak pit. **(2 Hours)**
- Paneled, doors, windows and ventilators in wood, Glazed paneled, wooden doors: **(2 Hours)**
- Residential building- with load wearing walls, including details of doors and windows: **(2 Hours)**
- Preparation of site plans and service plans as per Building Rules: **(2 Hours**)
- Roof trusses. Industrial buildings:**(2 Hours)**
- Perspective view of single story buildings.**(2 Hours)**

G. Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Books

- National Building Code of India
- Local Building Bye-laws
- Callender, John Hancock, Time Saver Standards for Architectural design Data, Tata McGraw Hill.
- Chiara, Callender, John Hancock, Time Saver Standards for Building Type, McGraw Hill

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Basic of 2-D Auto CAD	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
2	Drawing of Elements of Buildings, column, beam, footings by 2-D Auto CAD.	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
3	Drawing of RCC Details by Auto CAD.	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
4	Drawing of Residential Building, and school Building by Auto CAD.	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
5	Types of stair, RCC stair case, septic tank, Soak pit.	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
6	Paneled, doors, windows and ventilators in wood, Glazed paneled,	Practical	CIV322.1	Mid Term-1, Quiz

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	wooden doors:			& End Sem Exam
7	Residential building- with load wearing walls, including details of doors and windows.	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
8	Preparation of site plans and service plans as per Building Rules	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
9	Roof trusses. Industrial buildings	Practical	CIV322.1	Mid Term-1, Quiz & End Sem Exam
10	Perspective view of single story buildings.			

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV322.1	Function as design consultants in construction industry for the design of civil engineering structures.	3	3	1	3	1				2		2	1	1	2	1
CIV322.2	Provide sustainable solutions to the Civil Engineering Problems	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–III)2023-24		
Class: B.Tech (CE) 3rd Semester		
Subject Name: CIV 321 Computer Aided Civil Engg drawing Lab	Time:1.5Hrs	Max.Marks:30

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Levels of thequestions as perBloomsTaxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to
CO1: Using the software for the design of buildings, making plans.
CO2: Applying the basic concept of drawing
CO3: Understanding the various projections.

CO Map	Question No.	Question	Marks
CO1	Q.1	Use Auto CADD to make 2-D plan of building	3
CO1	Q.2a	Discuss various key elements for building design.	3
	Q.2b	Write down various commands in Auto-CADD	3
CO1	Q.3	Discuss different building bye law in detail.	6
CO2	Q.4	Discuss drawing detail of single storey R.C.C building.	3
CO2	Q.5a	Draw orthographic projections.	3
	Q.5b	Discuss drawing detail of different types of paneled doors.	3
CO3	Q6	What do you mean by 2-d and 3-d projections. Discuss orthographic projection.	6

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

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Amity University Madhya Pradesh
B.Tech (Civil Engineering)
2022-2026
Exam Result For (Semester) : III
Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	CIV322 COMPUTER-AIDED CIVIL ENGINEERING DRAWING LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U13G13
1	A60215822002	Mr ADITYA BHADOURIYA	100	30	70	A+	10	1	1	10
2	A60215822001	Mr RISHAV KUMAR	100	30	70	A+	10	1	1	10
3	A60215822004	Mr SANSKAR SHARMA	100	30	70	A+	10	1	1	10
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	3	100.00	%	
			Attainment Level					Level 3		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **MATERIALS, TESTING & EVALUATION**
Course Code : CIV 401, Credits : 02, Session : 2023-24(Even Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Kantharia, Dr. Vimal Kumar Gupta

A. Introduction

Materials testing helps us to understand and quantify whether a specific material or treatment is suitable for a particular application. With the wide variety of materials and treatments available in the marketplace, testing can help narrow down the choices to the most appropriate selection for the intended use.

B. At the end of the course students will able to learn:

- **CIV 401.1** Understand the electronic sensors, Operate a data acquisition system.
- **CIV 401.2** Analyse various types of testing machines, Configure a testing machine to measure tension or compression behaviour.
- **CIV 401.3** Apply and Compute engineering values (e.g. stress or strain) from laboratory measures, Analyze a stress versus strain curve for modulus, yield strength and other related attributes

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. 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.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Identify the properties of engineering materials like cement, sand, concrete, ceramics, bitumen, structural steel etc.

PSO2: Explain the classification of engineering materials and uses of materials

PSO3: Understand the manufacturing process of cement, concrete, bitumen, glass, plastics, metals, paints and other engineering materials.

E.

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 isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof	A	5%

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	25%includesalltypesofleaves includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: **Introduction to Engineering Materials Covering:** Cements, M-Sand, Concrete (plain, reinforced and steel fibre/ glass fibre-reinforced, light-weight concrete, High Performance Concrete, Polymer Concrete) Ceramics, and Refractories, Bitumen and asphaltic materials, Timbers, Glass and Plastics, Structural Steel and other Metals, Paints and Varnishes, Acoustical material and geo-textiles, rubber and asbestos, laminates and adhesives, Graphene, Carbon composites and other engineering materials including properties and uses of these.

Module II: **Introduction to Material Testing Covering**: What is the " Material Engineering" ?; Mechanical behavior and mechanical characteristics; Elasticity – principle and characteristics; Plastic deformation of metals; Tensile test – standards for different material (brittle, quasi-brittle, elastic and so on) True stress – strain interpretation of tensile test; hardness tests; Bending and torsion test; strength of ceramic.

Module III: **Introduction to Material Testing Covering**: Internal friction, creep – fundaments and characteristics; Brittle fracture of steel – temperature transition approach; Background of fracture mechanics; Discussion of fracture toughness testing – different materials; concept of fatigue of materials; Structural integrity assessment procedure and fracture mechanics

Module IV: **Standard Testing & Evaluation Procedures Covering:** Laboratory for mechanical testing; Discussion about mechanical testing; Naming systems for various irons, steels and nonferrous metals; Discussion about elastic deformation; Plastic deformation; Impact test and transition temperatures; Fracture mechanics – background; Fracture toughness – different materials; Fatigue of material; Creep.

Module V: Testing*:* from the above modules covering, Understanding i) Tests & testing of bricks, ii) Tests & testing of sand, iii) Tests & testing of concrete, iv) Tests & testing of soils, v) Tests & testing of bitumen & bituminous mixes, vi) Tests & testing of polymers and polymer based materials, vii) Tests & testing of metals & viii) Tests & testing of other special materials, composites and cementitious materials. Explanation of mechanical behavior of these materials.

G. 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; Att: Attendance

H. Suggested Books

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- Chudley, R., Greeno (2006), 'Building Construction Handbook' (6th ed.),R. Butterworth-Heinemann
- Khanna, S.K., Justo, C.E.G and Veeraragavan, A, ' Highway Materials and Pavement Testing', Nem Chand& Bros, FifthEdition
- Various related updated & recent standards of BIS, IRC, ASTM, RILEM, AASHTO, etc. corresponding to materialsused for Civil Engineeringapplications
- Kyriakos Komvopoulos (2011), Mechanical Testing of Engineering Materials,Cognella
- E.N. Dowling (1993), Mechanical Behaviour of Materials,Prentice Hall International Edition
- AmericanSocietyforTestingandMaterials(ASTM),*AnnualBookofASTMStandards* (post 2000)
- Related papers published in international journals

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Cements, M-Sand, Concrete (plain, reinforced and steel fibre/ glass fibre-reinforced, Paints and Varnishes, Graphene.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
2	light-weight concrete, High Performance Concrete, Polymer Concrete) Ceramics, and Refractories	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
3	Bitumen and asphaltic materials, Timbers.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
4	Glass and Plastics, Structural Steel and other Metals	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
5	Acoustical material and geo-textiles, rubber and asbestos, laminates and adhesives	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
6	Carbon composites and other engineering materials including properties and uses of these.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
7	What is the " Material Engineering" ?;; Elasticity –;and so on);	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
8	Mechanical behavior and mechanical characteristics	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
9	principle and characteristics.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
10	Plastic deformation of metals; Tensile test – standards for different material (brittle, quasi-brittle, elastic.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam

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11	True stress – strain interpretation of tensile test	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
12	hardness tests; Bending and torsion test; strength of ceramic.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
13	Internal friction, creep – fundaments and characteristics;;;; concept of fatigue of materials;	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
14	Brittle fracture of steel – temperature transition approach.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
15	Background of fracture mechanics.	Lecture	CIV401.1	Mid Term-1, Quiz & End Sem Exam
16	Discussion of fracture toughness testing – different materials.	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
17	Structural integrity assessment procedure and fracture mechanics	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
18	For mechanical testing; Discussion about mechanical testing; Naming systems for various irons.	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
19	steels and nonferrous metals; Discussion about elastic deformation; Plastic deformation.	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
20	Impact test and transition temperatures; Fracture mechanics – background; Fracture toughness – different materials; Fatigue of material; Creep.	Lecture	BTCE401.1	Mid Term-1, Quiz & End Sem Exam
21	Tests & testing of bitumen & bituminous mixes, vi) Tests & testing of polymers and polymer based materials, vii)	Lecture	BTCE401.1	Assignment, Quiz & End Sem Exam
22	Tests & testing of metals & viii) Tests & testing of other special materials, composites and cementitious materials.	Lecture	BTCE401.1	Assignment, Quiz & End Sem Exam
23	Explanation of mechanical behavior of these materials.	Lecture	BTCE401.1	Assignment, Quiz & End Sem Exam
24	Tests & testing of bricks, ii) Tests & testing of sand, iii) Tests & testing of concrete, iv) Tests & testing of soils, v)	Lecture	BTCE401.1	Assignment, Quiz & End Sem Exam

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

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CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV401.1	Explain standards for different materials, stress-strain interpretation. Describe the fundamentals of internal friction, creep, brittle fracture of steel. Describe the testing procedures of fresh and hardened concrete	3	3	1	3	1				2		2	1	1	2	1
CIV401.2	Understand the concept of fatigue of materials, structural integrity assessment procedure. Perform the mechanical testing of various metals like iron, steel and non-ferrous metals.	3	2	2	2	2				2		1	1	2	2	1
CIV401.3	Explain elastic deformation and plastic deformation of metals. Understand the impact testing, fatigue and creep of materials. Explain fracture toughness of different materials like steel and non-ferrous metals. Explain the testing procedures of bricks and sand.	2	1	1	2	2				2		1	1	2	2	1

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Sample Question Paper

Amity School of Engineering and Technology
Department of CIVIL Engineering
MID-SEMESTER(SEM–IV)2023-24

Class: B.Tech (CE) 4th Semester

Subject t Name: CIV 401 MATERIALS, TESTING & EVALUATION	Time:1.5Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to
CO1: Understand the basic concept of stress and strain
CO2: Analysis of various types of materials properties and machines.
CO3: Calculation of various parameters Young's Modulus, Yield strength

CO Map	Question No.	Question	Marks
CO1	Q.1	What is stress and different types of stress?	3
CO1	Q.2a	Discuss relation between stress and strain.	3
	Q.2b	What do you understand by fracture modes of steel?	3
CO1	Q.3	What do you understand by fracture toughness?	6
CO2	Q.4	Calculate the stress and strain value for different grades of steel.	3
CO2	Q.5a	Calculate fracture toughness value for given steel specimen.	3
	Q.5b	Discuss various tests used to find the strength of steel.	3
CO3	Q6	Calculate the Yield and Young's modulus value for different grades of steel.	6

Attainments		**Rubric**
Level	1	IF60%ofstudentssecuremorethan60%marksthenlevel1

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Level	2	IF70%ofstudentssecuremorethan60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan60%marksthenlevel3

Amity University Madhya Pradesh
B.Tech (Civil Engineering)
2022-2026
Exam Result For (Semester) : IV
Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	CIV401 MATERIALS, TESTING & EVALUATION							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U3G3
1	A60215822001	Mr RISHAV KUMAR	100	30	70	A+	10	2	2	20
2	A60215822002	Mr ADITYA BHADOURIYA	100	30	70	A+	10	2	2	20
3	A60215822004	Mr SANSKAR SHARMA	100	30	70	A+	10	2	2	20

Total No. of Students	=	3		
Total No. of Students	>60 % marks	3	100.00	%
Attainment Level			Level 3	

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **ENGINEERING GEOLOGY**
Course Code : CIV 402, Credits : 02, Session : 2023-24(Even Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Kantharia, Mr. Sachin Tiwari

A. Introduction

Engineering Geology is the application of the geologic sciences to engineering practice to **assure the safe location, design, construction, operation and maintenance of engineering works**, which may not be adversely affected by potential geological problems.

B. At the end of the course students will able to learn:

- **CIV 402.1** Understand the Site characterization and how to collect, analyze, and report geologic data using standards in engineering practice,The fundamentals of the engineering properties of earth materials.
  The mechanics of soils and fluids and their influence on settlement, liquefaction, and soil slope stability.
- **CIV 402.2** Analyse Rock mass characterization and the mechanics of planar rock slide sand topples.
- **CIV 402.3** Apply Soil characterization and the Unified Soil Classification System.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

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PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. 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.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

PSO2: Provide sustainable solutions to the Civil Engineering Problems

PSO3: It. will help students to analyze and Provide concrete solution to environmental problem.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		

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	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: Branches and scope of geology, Physical Geology: Structure of the earth, Geological agents and their action, physical and chemical weathering, geological work done by wind, river, river meandering, glacial formation, coastal formation, underground water.

Module II: Mineralogy and Elements of Crystallography: Study of properties of minerals, formation, various groups of minerals, silicate, Felspar, pyroxene, mica. Various important minerals hornblende, Muscovite, Quartz, Corundum, calcite, Anthophyllite etc. Elements of a crystal, Cristallographique Axis, Crystal classes and system, Isométric, Tétragonal, Hexagonal, Orthorhombic, Monoclinic, Triclinic, System.

Module III: Petrology: Study of Igneous, Sedimentary, and metamorphic Rocks. Their texture, classification structure, forms, and engineering Use, Important rocks Granite, Gabbro, Dolerite, Pegmatite, Breccia, Sandstone, Shale, Limestone, Coals, Gypsum, Slate, Gneiss, Quartzite,

Module IV: Structural Geology and Ground Water: Types of folds, faults and joints, their classification and causes. Earthquake, volcanism and plate tectonics,Slope failures and landslides, elements of rock Mechanics.HydrogeologyGroundwater and occurrence, investigations, quality, artificial recharge

Module V: Geology in Civil Engineering, Stratigraphy and Geology of India: Tunnels, dams, reservoirs, Tunnels, Roads. Types of structures and classification and their effect on civil Engineering projects. Types, age and occurrence of rock formations and economic importance, study of Cuddapah, Vindhyan Dharwar, Deccan, and Gondwana group. Indian mineral deposits Coal, Petroleum, metallic and nonmetallic ores.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE

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Weightage (%)	5	15	10	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

H. Suggested Books

- R. Vaidyanathan, P. Perumal, Comprehensive Structural Analysis Vol. I & II, Laxmi Publications, New Delhi
- Reddy C.S., Basic Structural Analysis, 2nd ed., Tata McGraw Hill, New Delhi (2004).

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Structure of the earth, geological work done by wind, river,	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
2	Geological agents and their action	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
3	physical and chemical weathering	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
4	River meandering, glacial formation.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
5	coastal formation, underground water	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
6	Study of properties of minerals, mica.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
7	various groups of minerals.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
8	formation, silicate, Felspar, pyroxene	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
9	Various important minerals hornblende, Muscovite, Quartz	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
10	Elements of a crystal, Cristallographique Axis, Crystal classes and system.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
11	Anthophyllite etc. , Isométric, Tétragonal, Hexagonal, Orthorhombic	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
12	Corundum, calcite, Monoclinic, Triclinic, System.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
13	Study of Igneous, Sedimentary, and metamorphic Rocks.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam

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14	Important rocks Granite, Gabbro, Dolerite, Pegmatite, Breccia, Sandstone.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
15	classification structure, forms, and engineering Use, Shale, Limestone	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
16	Coals, Gypsum, Slate, Gneiss, Quartzite	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
17	Rocks and Their texture.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
18	Structural Geology and Ground Water:	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
19	Earthquake, volcanism and plate tectonics,Slope failures and landslides, elements of rock Mechanics.	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
20	Hydrogeology Groundwater and occurrence, investigations, quality, artificial recharge	Lecture	CIV402.1	Mid Term-1, Quiz & End Sem Exam
21	Types of folds, faults and joints, their classification and causes.	Lecture	CIV402.1	Assignment, Quiz & End Sem Exam
22	Tunnels, dams, reservoirs, Tunnels, Roads. Types of structures and classification and their effect on civil Engineering projects..	Lecture	CIV402.1	Assignment, Quiz & End Sem Exam
23	Types, age and occurrence of rock formations and economic importance, study of Cuddapah, Vindhyan Dharwar, Deccan, and Gondwana group	Lecture	CIV402.1	Assignment, Quiz & End Sem Exam
24	Indian mineral deposits Coal, Petroleum, metallic and nonmetallic ores.	Lecture	CIV402.1	Assignment, Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

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CIV402.1	Students will able to understand the presence of different types of rocks and their classification.	3	3	1	3	1				2		2	1	1	2	1
CIV402.2	To get a understanding of different types of geological formation and have knowledge of different types of minerals.	3	2	2	2	2				2		1	1	2	2	1
CIV402.3	To have a clears idea about the different geomorphic process.	2	1	1	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology
Department of CIVIL Engineering
MID-SEMESTER(SEM–IV)2023-24

Class: B.Tech (CE) 4th Semester

Subject t Name: CIV 402 Engineering Geology	Time:1.5Hrs	Max.Marks:30

Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to
CO1: Understand the basic concept and different properties of rocks
CO2: Analyze different types of materials and rocks.
CO3: Understand the soil formation and characterization.

CO Map	Question No.	Question	Marks
CO1	Q.1	What do you understand by geology?	3
CO1	Q.2a	What is rock? Discuss different types of rocks.	3
	Q.2b	Discuss different classification of rocks and its properties.	3
CO1	Q.3	Discuss Types of folds, faults and joints, their classification and causes.	6

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CO2	Q.4	Discuss various types of geological formation in detail.	3
CO2	Q.5a	Discuss Earthquake, volcanism and plate tectonic in details.	3
	Q.5b	Discuss Slope failures and landslides with neat sketch.	3
CO3	Q6	Discuss Hydrogeology Groundwater and artificial recharge.	6

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

Amity University Madhya Pradesh
B.Tech (Civil Engineering)
2022-2026
Exam Result For (Semester) : IV
Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	CIV402 ENGINEERING GEOLOGY							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U4G4
1	A60215822001	Mr RISHAV KUMAR	100	30	70	A	9	2	2	18
2	A60215822002	Mr ADITYA BHADOURIYA	100	30	70	B+	7	2	2	14
3	A60215822004	Mr SANSKAR SHARMA	100	30	70	A-	8	2	2	16
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	2	66.67	%	
			Attainment Level					Level 1		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **SURVEYING**
Course Code : CIV 403, Credits : 03, Session : 2023-24(Even Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Kantharia, Mr. Sachin Tiwari, Dr. Ripunjoy Gogoi

A. Introduction

Surveying is **the process of determining the relative position of natural and man- made features on or under the earth's surface**, the presentation of this information either graphically in the form of plans or numerically in the form of tables, and the setting out of measurements on the earth's surface.

B. At the end of the course students will able to learn:

CIV403.1 Apply the knowledge, techniques, skills, and applicable tools of the discipline to engineering and surveying activities.

CIV403.2 Relate the knowledge on Surveying to the new frontiers of science like Hydrographic surveying, Electronic Distance Measurement, Global Positioning System, Photo grammetry and Remote Sensing.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

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PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. 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.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: apply the knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve well-defined surveying problems appropriate to the discipline.

PSO2: design solutions for well-defined technical problems and assist with engineering design of systems, components, or processes appropriate to the discipline

E.

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 isrequiredtobemaintainedbyastu	A	5%

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	dentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: Introduction to Surveying: Principles, Linear, angular and graphical methods, Survey stations, Survey lines- ranging, bearing of survey lines, Levelling: Plane table surveying, Principles of levelling- booking and reducing levels; differential, reciprocal leveling, profile levelling and cross sectioning. Digital and Auto Level, Errors in levelling; contouring: Characteristics, methods, uses; areas and volumes. Theodolite survey: Instruments, Measurement of horizontal and vertical angle; Horizontal and vertical control - methods - triangulation - network- Signals. Baseline - choices - instruments and accessories - extension of base lines - corrections - Satellite station - reduction to centre - Intervisibility of height and distances - Trigonometric leveling - Axis single corrections.

Module II: **Curves:** Elements of simple and compound curves – Method of setting out– Elements of Reverse curve - Transition curve – length of curve – Elements of transition curve - Vertical curve.

Module III: **Modern Field Survey Systems:** Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Distomat, Total Station – Parts of a Total Station – Accessories –Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey; Global Positioning Systems- Segments, GPS measurements, errors and biases, Surveying with GPS, Co-ordinate transformation, accuracy considerations.

Module IV: Photogrammetry Surveying: Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; photographic mapping- mapping using paper prints, mapping using stereoplotting instruments, mosaics, map substitutes.

Module V: **Remote Sensing:** Introduction –Electromagnetic Spectrum, interaction of electromagnetic radiation with the atmosphere and earth surface, remote sensing data acquisition: platforms and sensors; visual image interpretation; digital image processing.

G. 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; Att: Attendance

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H. Suggested Books

- Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India,2006.
- Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros,2011
- Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International,2010
- Chandra, A.M., Higher Surveying, Third Edition, New Age International (P) Limited, 2002.
- Anji Reddy, M., Remotesensing and Geographical information system, B.S. Publications,2001.
- Arora, K.R., Surveying, Vol-I, II and III, Standard Book House,2015.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Principles, Linear, angular and graphical methods, Survey stations, Survey lines- ranging,; differential.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
2	bearing of survey lines, Levelling: Plane table surveying, Principles of levelling- booking and reducing levels	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
3	contouring: Characteristics, methods, uses; areas and volumes. Theodolite survey.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
4	Reciprocal leveling, profile levelling and cross sectioning. Digital and Auto Level, Errors in levelling	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
5	Instruments, Measurement of horizontal and vertical angle; Horizontal and vertical control - methods -triangulation - network- Signals.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
6	Baseline - choices - instruments and accessories - extension of base lines - corrections	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
7	Satellite station - reduction to centre - Intervisibility of height and distances - Trigonometric leveling - Axis single corrections.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
8	Elements of simple and compound curves. Elements of transition	Lecture	CIV 403.1	Mid Term-1, Quiz

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	curve - Vertical curve.			& End Sem Exam
9	Method of setting out	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
10	Elements of Reverse curve	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
11	Transition curve – length of curve.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
12	Principle of Electronic Distance Measurement.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
13	Types of EDM instruments.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
14	Modulation, Distomat, Total Station – Parts of a Total Station.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
15	Accessories –Advantages and Applications, Field Procedure for total station survey.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
16	Co-ordinate transformation, accuracy considerations	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
17	Global Positioning Systems-Segments, GPS measurements	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
18	Errors in Total Station Survey.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
19	Errors and biases, Surveying with GPS.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
20	Introduction, Basic concepts, perspective geometry of aerial photograph.	Lecture	CIV 403.1	Mid Term-1, Quiz & End Sem Exam
21	Basic concepts, perspective geometry of aerial photograph	Lecture	CIV 403.1	Assignment, Quiz & End Sem Exam
22	relief and tilt displacements	Lecture	CIV 403.1	Assignment, Quiz & End Sem Exam
23	terrestrial photogrammetry, flight planning.	Lecture	CIV 403.1	Assignment, Quiz & End Sem Exam
24	Stereoscopy, ground control extension for photographic mapping.	Lecture	CIV 403.1	Assignment, Quiz & End Sem Exam
25	Aerial triangulation, radial triangulation, methods.	Lecture	CIV 403.1	Assignment, Quiz & End Sem Exam
26	photographic mapping- mapping using paper prints	Lecture	CIV 403.1	Assignment, Quiz & End Sem Exam
27	Mapping using stereoplotting instruments, mosaics, map	Lecture	CIV 403.1	Assignment, Quiz & End Sem Exam

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	substitutes			
28	mapping using stereoplotting instruments, mosaics, map substitutes	Lecture	CIV 403.1	Assignment, Quiz & End Sem Exam
29	Introduction, –Electromagnetic Spectrum.	Lecture	CIV 403.1	Assignment, Quiz & End Sem Exam
30	Electromagnetic Spectrum	Lecture	CIV 403.1	Assignment, Quiz & End Sem Exam
31	Interaction of electromagnetic radiation with the atmosphere and earth surface.	Lecture	CIV 403.1	Assignment, Quiz & End Sem Exam
32	Interaction of electromagnetic radiation with the atmosphere and earth surface.	Lecture	CIV 403.1	Assignment, Quiz & End Sem Exam
33	Remote sensing data acquisition.	Lecture	CIV 403.1	Assignment, Quiz & End Sem Exam
34	Platforms and sensors; visual image.	Lecture	CIV 403.1	Assignment, Quiz & End Sem Exam
35	Interpretation; digital image processing.	Lecture	CIV 403.1	Assignment, Quiz & End Sem Exam
36	Interpretation; digital image processing.	Lecture	CIV 403.1	Assignment, Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV403.1	Student will able to learn about different process of angle measurement in vertical and horizontal plane with manually and by using various devices.	3	3	1	3	1				2		2	1	1	2	1

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CIV403.2	Setting out the correct orientation of any structural components and different distances measurement techniques.	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2023-24						
Class: B.Tech (CE) 4th Semester						
Subject t Name: CIV 403 SURVEYING		Time:1.5Hrs		Max.Marks:30		
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1,4	Q.2,3,6	Q.4	Q.2,5		

Student will be able to
CO1: Understand basic principles of surveying and tools.
CO2: Analyze different forms of science with new technique and instruments.

CO Map	Question No.	Question	Marks
CO1	Q.1	What is principle of surveying?	3
CO1	Q.2a	What do you understand by theodlite survey?	3
	Q.2b	Elements of simple and compound curves – Method of setting out curves.	3
CO1	Q.3	Discuss Elements of Reverse curve.	6
CO2	Q.4	Discuss Transition curve – length of curve Elements of transition curve.	3
CO2	Q.5a	Discuss Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments.	3

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	Q.5b	Discuss principle of aerial survey and its importance.	3
CO2	Q6	Discuss remote sensing data acquisition, platforms and sensors.	6

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

Amity University Madhya Pradesh
B.Tech (Civil Engineering)
2022-2026
Exam Result For (Semester) : IV
Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	CIV403 SURVEYING							
			Max Marks	CE Weightage (%)	ET Weightage (%)	GO	GP	ACU	ECU	U5G5
1	A60215822001	Mr RISHAV KUMAR	100	30	70	A+	10	3	3	30
2	A60215822002	Mr ADITYA BHADOURIYA	100	30	70	A	9	3	3	27
3	A60215822004	Mr SANSKAR SHARMA	100	30	70	A	9	3	3	27
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	3	100.00	%	
			Attainment Level					Level 3		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **FLUID MECHANICS**
Course Code : CIV 404, Credits : 03, Session : 2023-24(Even Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Sachin Tiwari

A. Introduction

Fluid mechanics is **the study of fluids either in motion (fluid dynamics) or at rest (fluid statics)**. Both liquids and gases are classified as fluids. There is a theory available for fluid flow problems, but in all cases it should be backed up by experiment. It is a highly visual subject with good instrumentation.

B. Students will be able to learn after completion of this course

- **CIV404.1** Understand the properties of fluids, pressure measurement devices, hydraulic forces on surfaces, bouncy and flotation in fluids.
- **CIV404.2** Analyse kinematics and static behavior of fluids, dimension and model analysis, laminar and turbulent flow.
- **CIV404.3** Understand low through pipes and orifices, boundary layer theory.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

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PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. 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.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Calculate Hydrostatic Force and its Location for a given geometry and orientation of plane surface. Examine the possibility of a flow using continuity equation.

PSO2: Employ Archimedes principle to solve numerical examples on Buoyancy, Identify and interpret different flows with relevant equations

PSO3: Distinguish velocity potential function and stream function and solve for velocity and acceleration of a fluid at a given location in a fluid flow, Examine stability of a floating body by determining its metacentric height.

E.

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	10%

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Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

Module I: Basic Concepts and Definitions: Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; variation of viscosity with temperature, Newton law of viscosity; vapour pressure, boiling point, cavitation; surface tension, capillarity, Bulk modulus of elasticity, compressibility.

Module II: Fluid Statics: Fluid Pressure: Pressure at a point, Pascals law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U-Tube Differential Manometer, Micromanometers. pressure gauges, Hydrostatic pressure and force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies.

Module III: Fluid Kinematics: Classification of fluid flow: steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One-, two- and three - dimensional continuity equations in Cartesian coordinate.

Module III: Fluid Dynamics: Surface and body forces; Equations of motion - Euler's equation; Bernoulli's equation – derivation; Energy Principle; Practical applications of Bernoulli's equation: venturimeter, orifice meter and pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow – Free and Forced; Dimensional Analysis and Dynamic Similitude - Definitions of Reynolds Number, Froude Number, Mach Number, Weber *Number and Euler Number; Buckingham's* π-Theorem. Notches and Weirs.

Module IV: Fluid Dynamics: Boundary layer theory, drag and lift force, drag on a sphere, rough and smoothboundaries, concept of mixinglength, boundary layer distribution for various shapes and for variousReynold'snumber.

G. 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; Att: Attendance

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H. Suggested Books

- R.K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications (P) Ltd., 2002.
- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007
- D.S. Kumar, "Fluid Mechanics and Fluid Power Engineering", S.K. Kataria& Sons, 2000.
- F. M. White, Introduction to Fluid Mechanics, McGraw Hill

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Distinction between a fluid and a solid.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
2	Density, Specific weight, Specific gravity	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
3	Kinematic and dynamic viscosity.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
4	variation of viscosity with temperature.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
5	Newton law of viscosity; vapour pressure.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
6	boiling point, cavitation; surface tension.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
7	capillarity, Bulk modulus of elasticity, compressibility.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
8	Fluid Pressure . pressure gauges..	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
9	Pressure at a point	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
10	Pascals law, pressure variation with temperature.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
11	Piezometer, U-Tube Manometer.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
12	Single Column Manometer.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
13	U-Tube Differential Manometer.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam

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14	Density and altitude. Micromanometers.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
15	Hydrostatic pressure and force	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
16	Hydrostatic pressure and force horizontal, vertical and inclined surfaces	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
17	Buoyancy and stability of floating bodies.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
18	Buoyancy and stability of floating bodies.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
19	Classification of fluid flow: steady and unsteady flow.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
20	Uniform and non-uniform flow.	Lecture	CIV 404.1	Mid Term-1, Quiz & End Sem Exam
21	laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow.	Lecture	CIV 404.1	Assignment, Quiz & End Sem Exam
22	Ideal and real fluid flow; one, two and three dimensional flows.	Lecture	CIV 404.1	Assignment, Quiz & End Sem Exam
23	Stream line, path line, streak line and stream tube; stream function, velocity potential function.	Lecture	CIV 404.1	Assignment, Quiz & End Sem Exam
24	One-, two- and three -dimensional continuity equations in Cartesian coordinate	Lecture	CIV 404.1	Assignment, Quiz & End Sem Exam
25	Surface and body forces;; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow -.	Lecture	CIV 404.1	Assignment, Quiz & End Sem Exam
26	Equations of motion - Euler's equation; Bernoulli's equation – derivation	Lecture	CIV 404.1	Assignment, Quiz & End Sem Exam
27	Energy Principle; Practical applications of Bernoulli's equation: venture-meter, orifice meter and pitot tube.	Lecture	CIV 404.1	Assignment, Quiz & End Sem Exam
28	Free and Forced; Dimensional Analysis and Dynamic Similitude	Lecture	CIV 404.1	Assignment, Quiz & End Sem Exam
29	Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number;	Lecture	CIV 404.1	Assignment, Quiz & End Sem Exam

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	Buckingham's π-Theorem. Notches and Weirs.			
30	**Fluid Dynamics:**	Lecture	CIV 404.1	Assignment, Quiz & End Sem Exam
31	Boundary layer theory, drag and lift force.	Lecture	CIV 404.1	Assignment, Quiz & End Sem Exam
32	drag on a sphere, rough and smooth boundaries.	Lecture	CIV 404.1	Assignment, Quiz & End Sem Exam
33	concept of mixing length,	Lecture	CIV 404.1	Assignment, Quiz & End Sem Exam
34	boundary layer distribution for various shapes and for various Reynold's number.	Lecture	CIV 404.1	Assignment, Quiz & End Sem Exam
35	boundary layer distribution for various shapes and for various Reynold's number.	Lecture	CIV 404.1	Assignment, Quiz & End Sem Exam
36	boundary layer distribution for various for various Reynold's number.	Lecture	CIV 404.1	Assignment, Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV404.1	Examine Bernoulli's equation for ideal and real fluids and evaluate the direction of flow. Distinguish between major loss and minor loss. Employ Darcy-Weichbach and Chezy's equation to calculate friction losses.	3	3	1	3	1				2		2	1	1	2	1

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CIV404.2	Interpret different pipe fittings and evaluate the fluid velocity considering major and minor losses. Sketch HGL and TEL for a given pipe setting	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of CIVIL Engineering MID-SEMESTER(SEM–IV)2023-24						
Class: B.Tech (CE) IV Semester						
SubjectName: CIV 404 Fluid Mechanics		Time:1.5Hrs		Max.Marks:30		
Levels of thequestions as perBloomsTaxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
QuestionMapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		
Student willbeableto CO1:Understand the different types of fluid and their nature CO2: Use of different types of pressure measuring devices						

COMap	QuestionNo.	Question	Marks
CO1	Q.1	Discuss different types of fluid	3
CO1	Q.2a	What are different types of flow	3
	Q.2b	Discuss Newton's law of viscosity	3
CO1	Q.3	What is Rehology?	6
CO2	Q.4	What do you mean by Barometer?	3
CO2	Q.5a	What is kinematic and dynamic viscosity	3
	Q.5b	Write different flow conditions.	3
CO2	Q6	Different types of manometers	6

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

Amity University Madhya Pradesh
B.Tech (Civil Engineering)
2022-2026
Exam Result For (Semester) : IV
Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	CIV404 FLUID MECHANICS							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U6G6
1	A60215822001	Mr RISHAV KUMAR	100	30	70	A+	10	3	3	30
2	A60215822002	Mr ADITYA BHADOURIYA	100	30	70	B-	5	3	3	15
3	A60215822004	Mr SANSKAR SHARMA	100	30	70	A	9	3	3	27
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	2	66.67	%	
			Attainment Level					Level 1		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **ENGINEERING GEOLOGY LAB**
Course Code : CIV 422, Credits : 01, Session : 2023-24(Even Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Kantharia, Dr. Ripunjoy Gogoi

A. Introduction

The study of various types of rock formation and its physical properties. Topics such as rocks and minerals, soils, and earthquake activities are discussed with special reference to local geological problems. This lab course also focuses on physical properties of minerals.

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

- **CIV422.1**. To understand the various types of rocks (Igneous Petrology), Identification of rocks (Sedimentary Petrology)
- **CIV422.2**. Analyze the difference of rocks (Metamorphic Petrolody), Minerals and crystallography

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

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PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. 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.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Students will able to understand the basic of rocks and various geological formations.

PSO2: Differentiate between different types of rocks and their origin and properties.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Mid Term 2		
	Seminar/Viva-	S/V/Q/H	10%

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	Voce/Quiz/Home Assignment	A	
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

- Study of physical properties ofminerals: **(2 Hours)**
- Study of spgravity of minerals and rocks **(2 Hours)**
- Study of different group ofminerals:**(2 Hours)**
- Study of Crystal and Crystalsystem:**(2 Hours)**
- Identification of minerals: Silica group: Quartz, Amethyst, Opal; Feldspar group: Orthoclase, Plagioclase; Cryptocrystalline group: Jasper; Carbonate group: Calcite; Element group: Graphite; Pyroxene group: Talc; Mica group: Muscovite; Amphibole group: Asbestos, Olivine, Hornblende, Magnetite, Hematite, Corundum, Kyanite, Garnet, Galena,Gypsum:**(2 Hours)**
- Identification of rocks (Igneous Petrology): Acidic Igneous rock: Granite and its varieties, Syenite, Rhyolite, Pumice, Obsidian, Scoria, Pegmatite, Volcanic Tuff. Basic rock: Gabbro, Dolerite, Basalt and its varieties,Trachyte.**(2 Hours)**
- Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shales and itsvarieties: **(2 Hours)**
- Identification of rocks (Metamorphic Petrolody): Marble, slate, Gneiss and its varieties, Schist and its varieties. Quartzite,Phyllite: **(2 Hours)**
- Study of topographical features from Geological maps. Identification of symbols inmaps: **(2 Hours)**
- Field study of foulds and faults:**(2 Hours)**

G. Examination Scheme:

IA	EE

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A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Books

- Parbin Singh, Engineering & General Geology, S.K. Kataria& Sons, New Delhi (2008)
- Bangar, K.M., Principles of Engineering Geology, Standard Publishers Distributors, Delhi (2009)
- Billings, Marland P., Structural Geology, 3rd ed., Prentice-Hall India, New Delhi.
- Todd, D.K., Ground Water Hydrology, 2nd ed., Wiley India, New Delhi (2008)

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Study of physical properties of minerals, Study of sp gravity of minerals and rocks	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
2	Study of different group of minerals.	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
3	Study of Crystal and Crystal system	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
4	Identification of minerals: Silica group: Quartz, Amethyst, Opal; Feldspar group: Orthoclase, Plagioclase; Cryptocrystalline group: Jasper; Carbonate group: Calcite; Element group: Graphite; Pyroxene group: Talc; Mica group: Muscovite.	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
5	Identification of rocks (Igneous Petrology): Acidic Igneous rock: Granite and its varieties, Syenite, Rhyolite, Pumice, Obsidian, Scoria, Pegmatite, Volcanic Tuff. Basic rock: Gabbro, Dolerite, Basalt and its varieties.	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
6	Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shales and itsvarieties	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
7	Study of topographical features	Practical	CIV422.1	Mid Term-1, Quiz

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	from Geological maps.			& End Sem Exam
8	Identification of rocks (Metamorphic Petrolody): Marble, slate, Gneiss and its varieties, Schist and its varieties. Quartzite.	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
9	Identification of symbols in maps	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam
10	Field study of foulds and faults	Practical	CIV422.1	Mid Term-1, Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV422.1	To understand the difference of rocks (Igneous Petrology), Identification of rocks (Sedimentary Petrology)	3	3	1	3	1				2		2	1	1	2	1
CIV422.2	Analyze the various types of rocks (Metamorphic Petrolody), Minerals and crystallography.	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering MID-SEMESTER(SEM–IV)2023-24
Class: B.Tech.(CE) IV Semester

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Subject Name: CIV 422 Engineering Geology Lab		Time:2 Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1, 2	Q.1, 2	Q. 1,2	Q.1,2	Q.1,2	Q.1,2
Student will be able to attain CO1 to 3						

CO Map	Question No.	Question	Marks
CO1-2	Q.1	Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shales and itsvarieties:	15
CO1-2	Q2	Study of topographical features from Geological maps. Identification of symbols inmaps: Field study of foulds and faults	15

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

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Amity University Madhya Pradesh
B.Tech (Civil Engineering)
2022-2026
Exam Result For (Semester) : IV
Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	CIV422 ENGINEERING GEOLOGY LAB Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U8G8
1	A60215822001	Mr RISHAV KUMAR	100	30	70	A+	10	1	1	10
2	A60215822002	Mr ADITYA BHADOURIYA	100	30	70	A	9	1	1	9
3	A60215822004	Mr SANSKAR SHARMA	100	30	70	A	9	1	1	9
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	3	100.00	%	
			Attainment Level					Level 3		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **MATERIAL TESTING AND EVALUATION LAB**
Course Code : CIV 421, Credits : 01, Session : 2023-24(Even Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Kantharia, Dr. Imran Ahmad Khan

A. Introduction

Materials testing **helps us to understand and quantify whether a specific material or treatment is suitable for a particular application**. With the wide variety of materials and treatments available in the marketplace, testing can help narrow down the choices to the most appropriate selection for the intended use.

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

- **CIV421.1**. Understand the Gradation of coarse and fine aggregates ,Different corresponding tests and need/application of these tests in design and quality control.
- **CIV421.2**. Apply Tensile Strength of materials &concrete composites.
- **CIV421.3**. Analyse Compressive strength test on aggregates.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

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PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. 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.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Function as design consultants in construction industry for the design of civil engineering structures.

PSO2: Provide sustainable solutions to the Civil Engineering Problems

PSO3: It. will help students to analyze and Provide concrete solution to environmental problem

E.

Component of Evaluation	Description	Code	Weightag

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			e %
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 isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

- Gradation of course and fineaggregates. Different corresponding tests and need/ application of these tests in design and quality control**. (2 Hours)**
- Concrete permeability test, and tiles abrasion test **(1 Hour)**
- Tensile Strength of materials & concrete composites. Compressive strength test onaggregates**(1 Hour)**
- Tension I-Elastic Behaviour of metals & materials. Tension II-Failure of CommonMaterials: **(2 Hours)**
- Direct Shear-Frictional Behaviour. Concrete I-Early Age Properties: **(2 Hours)**
- Concrete II-Compression and Indirect Tension. Compression-Directionality: **(2 Hours)**
- Soil Classification. Consolidation and Strength Tests: **(2 Hours)**
- Tension III-Heat Treatment. Torsion test: **(2 Hours)**
- Hardness tests (Brinnel's and Rockwell). Tests on closely coiled and open coiled springs: **(2 Hours)**
- Theories of Failure and Corroboration with Experiments. Tests on unmodified bitumen and modified binders with polymers: **(2 Hours)**
- Bituminous Mix Design and Tests on bituminous mixes – Marshall method. Concrete Mix Design as per BIS: **(2 Hours)**

G. Examination Scheme:

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IA				EE	
A	PR	LR	V	PR	V
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Books

- National Building Code of India
- Local Building Bye-laws
- Callender, John Hancock, Time Saver Standards for Architectural design Data, Tata McGraw Hill.
- Chiara, Callender, John Hancock, Time Saver Standards for Building Type, McGraw Hill

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Gradation of course and fineaggregates. Different corresponding tests and need/ application of these tests in design and quality control.	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
2	Concrete permeability test, and tiles abrasion	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
3	Tensile Strength of materials & concrete composites. Compressive strength test on aggregates	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
4	Tension I-Elastic Behaviour of metals & materials. Tension II-Failure of Common Materials	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
5	Direct Shear-Frictional Behaviour. Concrete I-Early Age Properties	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
6	Concrete II-Compression and Indirect Tension. Compression-Directionality.	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
7	Soil Classification. Consolidation and Strength Tests: Tension III-Heat Treatment. Torsion test	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
8	Hardness tests (Brinnel's and Rockwell). Tests on closely coiled and open coiled springs	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam
9	Theories of Failure and Corroboration with Experiments.	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam

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	Tests on unmodified bitumen and modified binders with polymers			
10	Bituminous Mix Design and Tests on bituminous mixes – Marshall method. Concrete Mix Design as per BIS	Practical	CIV421.1	Mid Term-1, Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV421.1	Function as design consultants in construction industry for the design of civil engineering structures.	3	3	1	3	1				2		2	1	1	2	1
CIV421.2	Provide sustainable solutions to the Civil Engineering Problems related with materials and their strength.	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering MID-SEMESTER(SEM–IV)2023-24		
Class: B.Tech.(CE) IV Semester		
Subject Name: CIV 421 Material Testing and Evaluation Lab	Time:2 Hrs	Max.Marks:30

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Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1, 2,3	Q.1, 2,3	Q. 1,2,3	Q.1,2,3	Q.1,2,3	Q.1,2,3
Student will be able to attain CO1 to 3						

CO Map	Question No.	Question	Marks
CO1-3	Q.1	Tensile Strength of materials & concrete composites. Compressive strength test on aggregates	10
CO1-3	Q2	Tension I-Elastic Behaviour of metals & materials. Tension II-Failure of Common Materials.	10
CO1-3	Q3	Theories of Failure and Corroboration with Experiments. Tests on unmodified bitumen and modified binders with polymers.	10

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

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Amity University Madhya Pradesh
B.Tech (Civil Engineering)
2022-2026
Exam Result For (Semester) : IV
Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	CIV421 MATERIALS TESTING AND EVALUATION LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U9G9
1	A60215822001	Mr RISHAV KUMAR	100	30	70	A+	10	1	1	10
2	A60215822002	Mr ADITYA BHADOURIYA	100	30	70	A+	10	1	1	10
3	A60215822004	Mr SANSKAR SHARMA	100	30	70	A+	10	1	1	10
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	3	100.00	%	
			Attainment Level					Level 3		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **SURVEYING LAB**
Course Code : CIV 423, Credits : 01, Session : 2023-24(Even Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Kantharia, Dr. Ripunjoy Gogoi

A. Introduction

Surveying Lab offers additional experience in fundamental land surveying measurement methods for surveying courses, including precision steel taping methods to perform horizontal measurements, digital theodolites to perform angular measurements and traditional and automatic levels for elevation measurements.

B. At the end of the course students will able to learn following idea's

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

- **CIV423.1** Understand the Chain survey - Traversing and plotting of details. Chain survey – Measurement of Area by offsetting.
- **CIV423.2**. Analyze the Compass survey - Traversing with compass and calculation of Interior angles. The use of advance survey instrument, Total station, theodolite etc.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

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PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. 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.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Students will able to understand the basic of different types of methods for measuring the distances and elevations of different points.

PSO2: Student will apply practical knowledge for determining the various control points.

E.

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous	Mid Term 1	CT	15%

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Internal Evaluation	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Course Content

- Chain survey-Traversing and plotting of details: **(2 Hours)**
- Chain survey-Measurement of Area by offsetting: **(2 Hours)**
- Compass survey - Traversing with compass and calculation of Interior angles: **(2 Hours)**
- Plane table survey-Method of Radiation: **(2 Hours)**
- Plane table survey-Method of Intersection: **(2 Hours)**
- Leveling Fly Leveling-Plane of collimation method: **(2 Hours)**
- Leveling Fly leveling-Rise and Fall method: **(2 Hours)**
- Total station uses in angles and sop distance measurement.: **(2 Hours)**
- Total station leveling and Contour surveying, Topographical maps.: **(2 Hours)**
- Theodolite surveying-Measurement of horizontal angle by method of repetition and reiteration:**(2 Hours)**

G. Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Books

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- Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India,2006.
- Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros,2011
- Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International,2010
- Chandra, A.M., Higher Surveying, Third Edition, New Age International (P) Limited, 2002.
- Anji Reddy, M., Remotesensing and Geographical information system, B.S. Publications,2001.
- Arora, K.R., Surveying, Vol-I, II and III, Standard Book House,2015.

I. **Lecture Plan**

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Chain survey-Traversing and plotting of details.	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
2	Chain survey-Measurement of Area by offsetting.	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
3	Compass survey - Traversing with compass and calculation of Interior angles.	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
4	Plane table survey-Method of Radiation.	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
5	Plane table survey-Method of Intersection.	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
6	Leveling Fly Leveling-Plane of collimation method	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
7	Leveling Fly leveling-Rise and Fall method.	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
8	*Total station uses in angles and sop distance measurement.*	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
9	Total station leveling and Contour surveying, Topographical maps	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam
10	Theodolite surveying-Measurement of horizontal angle by method of repetition and reiteration.	Practical	CIV423.1	Mid Term-1, Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES	CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES

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		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV423.1	Understand the Chain survey - Traversing and plotting of details. Chain survey – Measurement of Area by offsetting.	3	3	1	3	1				2		2	1	1	2	1
CIV423.2	Analyze the Compass survey - Traversing with compass and calculation of Interior angles. The use of advance survey instrument, Total station, theodolite etc.	3	2	2	2	2				2		1	1	2	2	1

Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering MID-SEMESTER(SEM–IV)2023-24						
Class: B.Tech.(CE) IV Semester						
Subject Name: CIV 423 Surveying Lab		Time:2 Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1, 2	Q.1, 2	Q. 1,2	Q.1,2	Q.1,2	Q.1,2
Student will be able to attain CO1 to 3						

CO Map	Question No.	Question	Marks
CO1-2	Q.1	• Chain survey-Traversing and plotting of details • Chain survey-Measurement of Area by offsetting	15
CO1-2	Q2	• Compass survey - Traversing with compass and calculation of Interior angles • Plane table survey-Method of Radiation • Plane table survey-Method of Intersection	15

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

Amity University Madhya Pradesh
B.Tech (Civil Engineering)
2022-2026
Exam Result For (Semester) : IV
Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	CIV423 SURVEYING LAB Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U10G10
1	A60215822001	Mr RISHAV KUMAR	100	30	70	A+	10	1	1	10
2	A60215822002	Mr ADITYA BHADOURIYA	100	30	70	A+	10	1	1	10
3	A60215822004	Mr SANSKAR SHARMA	100	30	70	A+	10	1	1	10
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	3	100.00	%	
			Attainment Level					Level 3		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **CIVIL ENGINEERING – SOCIETAL & GLOBAL IMPACT**
Course Code : CIV407, Credits : 02, Session : 2023-24(E ven Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Mohan Kantharia, Dr. Ripunjoy Gogoi

A. Introduction

The course is designed to provide a better understanding of the impact which Civil Engineering has on the Society at large and on the global arena. Civil Engineering projects have an impact on the Infrastructure, Energy consumption and generation, Sustainability of the Environment, Aesthetics of the environment, Employment creation, Contribution to the GDP, and on a more perceptible level, the Quality of Life.

B. After completion of this course students will able to learn

- **CIV407.1** Understand the impact which Civil Engineering projects have on the Society at large and on the global arena and using resources efficiently and effectively.
- **CIV407.2** Understand extent of Infrastructure, its requirements for energy and how they are met: past, present and future, the Sustainability of the Environment, including its Aesthetics.
- **CIV407.3** Analyse potentials of Civil Engineering for Employment creation and its Contribution to the GDP,the Built Environment and factors impacting the Quality of Life.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

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PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. 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.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1 Associate various measures for enhancing the build environment, thereby improving quality of life of the occupants.

PSO2: Evaluate the potential of Civil Engineering for employment creation and its contribution to the GDP.

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 isrequiredtobemaintainedbyastudentto be qualified for taking up	A	5%

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	the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

E. Course Content

Module I:Introduction to Course and Overview: Understanding the past to look into the future: Pre-industrial revolution days, Agricultural revolution, first and second industrial revolutions, IT revolution; Recent major Civil Engineering breakthroughs and innovations; Present day world and future projections, Evaluating future requirements for various resources; GIS and applications for monitoring systems; Human Development Index and Ecological Footprint of India Vs other countries and analysis.

Module II: Understanding the importance of Civil Engineering in Shaping and Impacting the World: The ancient and modern Marvels and Wonders in the field of Civil Engineering; Future Vision for Civil Engineering

Module III: Infrastructure - Habitats, Megacities, Smart Cities, Futuristic Visions: Transportation (Roads, Railways & Metros, Airports, Seaports, River ways, Sea canals, Tunnels (below ground, under water); Futuristic systems (ex, Hyper Loop)); Energy generation (Hydro, Solar (Photovoltaic, Solar Chimney), Wind, Wave, Tidal, Geothermal, Thermal energy); Water provisioning; Telecommunication needs (towers, above-ground and underground cabling).

Module IV: Environment: Traditional & futuristic methods; Solid waste management, Water purification, Wastewater treatment & Recycling, Hazardous waste treatment; Flood control (Dams, Canals, River interlinking), Multi-purpose water projects, Atmospheric pollution;

Module V: Built Environment: Recycling, Temperature/ Sound control in built environment, Conservation, Repairs & Rehabilitation of Structures & Heritage structures; Innovations and methodologies for ensuring Sustainability

Module VI: Civil Engineering Projects: Environmental Impact Analysis procedures; Waste (materials, manpower, equipment) avoidance/ Efficiency increase; Advanced construction techniques for better sustainability; Techniques for reduction of Green House Gas emissions in various aspects of Civil Engineering Projects; contribution of Civil Engineering to GDP.

G. 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; Att: Attendance

H. Suggested Books

Brito, Ciampi, Vasconcelos, Amarol, Barros (2013) Engineering impacting Social, Economic and Working Environment, 120th ASEE Annual Conference and Exposition.

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NAE Grand Challenges for Engineering (2006), Engineering for the Developing World, The Bridge, Vol 34, No.2, Summer2004.
Allen M. (2008) Cleansing the city. Ohio University Press. Athens Ohio.

I.Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Understanding the past to look into the future: Pre-industrial revolution days, Agricultural revolution, first and second industrial revolutions;	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
2	IT revolution; Recent major Civil Engineering breakthroughs and innovations	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
3	Present day world and future projections	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
4	GIS and applications for monitoring systems; Human Development Index and Ecological Footprint of India Vs other countries and analysis.	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
5	Evaluating future requirements for various resources.	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
6	The ancient and modern Marvels and Wonders in the field of Civil Engineering.	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
7	Future Vision for Civil Engineering	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
8	*Human Development Index and Ecological Footprint of India*	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
9	Transportation (Roads, Railways & Metros.);, Tidal, Geothermal, Thermal energy);	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
10	Airports, Seaports, River ways, Sea canals.	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
11	Tunnels (below ground, under water.	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
12	Futuristic systems (ex, Hyper Loop)	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam

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13	Energy generation (Hydro, Solar (Photovoltaic, Solar Chimney), Wind, Wave	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
14	Water provisioning; Telecommunication needs (towers, above-ground and underground cabling).	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
15	Traditional & futuristic methods; Solid waste management, Water purification.	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
16	Wastewater treatment & Recycling, Hazardous waste treatment	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
17	Recycling, Temperature/ Sound control in built environment, Conservation,;	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
18	Innovations and methodologies for ensuring Sustainability	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
19	Innovatins and methodologies for ensuring Sustainability Flood control (Dams, Canals, River interlinking), Multi-purpose water projects, Atmospheric pollution	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
20	Repairs & Rhabilitation of Structures & Heritage structures	Lecture	CIV 407.1	Mid Term-1, Quiz & End Sem Exam
21	Repairs & Rehabilitation of Structures & Heritage structures	Lecture	CIV 407.1	Assignment, Quiz & End Sem Exam
22	Environmental Impact Analysis procedures; Waste (materials, manpower, equipment) avoidance/	Lecture	CIV 407.1	Assignment, Quiz & End Sem Exam
23	emissions in various aspects of Civil Engineering Projects; contribution of Civil Engineering to GDP	Lecture	CIV 407.1	Assignment, Quiz & End Sem Exam
24	Efficiency increase; Advanced construction techniques for better sustainability; Techniques for reduction of Green House Gas	Lecture	CIV 407.1	Assignment, Quiz & End Sem Exam

J.Course Articulation Matrix (Mapping of COs with POs

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES	CORRELATION WITH PROGRAMME

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													SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV407.1	Students will be able to develop new idea about civil engineering and its impact on social life.	3	3	1	3	1				2		2	1	1	2	1
CIV407.2	Different types of energy sources linked to the development of society	3	2	2	2	2				2		1	1	2	2	1
CIV407.3	A new methods to reduce the effects of green house gases on the environment and its impact on human life.		2	1	3	2				2		1	1	2	1	

Amity University Madhya Pradesh

B.Tech (Civil Engineering)

2022-2026

Exam Result For (Semester) : IV

Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	**CIV407** CIVIL ENGINEERING - SOCIETAL & GLOBAL IMPACT							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U14G14
1	A60215822001	Mr RISHAV KUMAR	100	30	70	A+	10	2	2	20
2	A60215822002	Mr ADITYA BHADOURIYA	100	30	70	A	9	2	2	18
3	A60215822004	Mr SANSKAR SHARMA	100	30	70	A+	10	2	2	20
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	3	100.00	%	
			Attainment Level					Level 3		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : **FLUID MECHANICS LAB**
Course Code : CIV 424, Credits : 01, Session : 2023-24(Even Sem.), Class : B.Tech. 2nd Year
Faculty Name : Mr. Sachin Tiwari

A. Introduction

The Fluid Mechanics laboratory is designed to examine the properties of fluids and to conduct experiments involving both incompressible and compressible flow.

B. At the end of the course students will able to learn following idea's

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

- **CIV424.1** Understand the different types of fluid exists in nature their behaviour and characteristics.
- **CIV424.2**. Analyze the various types of losses and different types of flow conditions, calculate different types of forces observed by moving bodies in different flow conditions.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. 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.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1: Students will able to understand the basic of different types of methods for measuring the pressure with the help of different devices.

PSO2: Student will apply practical knowledge for determining the discharge from various sections and pipes.

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 isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves	A	5%

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	includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

E. Course Content

- Measurement of viscosity: **(2 Hours)**
- Study of Pressure MeasuringDevices: **(2 Hours)**
- Stability of FloatingBody: (2 **Hours**)
- Hydrostatics Force on Flat Surfaces/ CurvedSurfaces: (2 **Hours**)
- Verification of Bernoulli'sTheorem: (2 **Hours)**
- Venturimeter: (2 **Hours**)
- Orificemeter: (2 **Hours**)
- Impacts ofjets: (2 **Hours**)
- Flow Visualisation–IdealFlow: (2 **Hours**)
- Length of establishment offlow, velocity distribution inpipes, LaminarFlow: (2 **Hours**)

F. Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva.

G. Suggested Books

- R.K. Bansal, "Fluid Mechanics & Hydraulic Machines", Laxmi Publications (P) Ltd., 2002.
- Gupta, S. C., Fluid Mechanics and Hydraulic Machines, Pearson Education, 2007
- D.S. Kumar, "Fluid Mechanics and Fluid Power Engineering", S.K. Kataria& Sons, 2000.
- F. M. White, Introduction to Fluid Mechanics, McGraw Hill

H. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Measurement of viscosity	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
2	Study of Pressure Measuring Devices	Practical	CIV424.1	Mid Term-1, Quiz

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				& End Sem Exam
3	Stability of Floating Body:	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
4	Hydrostatics Force on Flat Surfaces/ Curved Surfaces	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
5	Verification of Bernoulli'sTheorem:	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
6	Venturimeter	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
7	Orificemeter	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
8	Impacts of jets:	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
9	Flow Visualisation–Ideal Flow:	Practical	CIV424.1	Mid Term-1, Quiz & End Sem Exam
10	Length of establishment off low, velocity distribution in pipes, Laminar Flow	Practical	CIV424.1	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		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV424.1	Understand the different types of fluid exists in nature their behaviour and characteristics.	3	3	1	3	1				2		2	1	1	2	1
CIV424.2	Analyze the various types of losses and different types of flow conditions, calculate different types of forces observed by moving bodies in different flow conditions.	3	2	2	2	2				2		1	1	2	2	1

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Sample Question Paper

Amity School of Engineering and Technology Department of Electronics and Communication Engineering MID-SEMESTER(SEM–IV)2023-24						
Class: B.Tech.(CE) IV Semester						
Subject Name: CIV 424 Fluid Mechanics Lab		Time:2 Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question Mapping	Q.1, 2	Q.1, 2	Q. 1,2	Q.1,2	Q.1,2	Q.1,2
Student will be able to attain CO1 to 3						

CO Map	Question No.	Question	Marks
CO1-2	Q.1	• Measurement of viscosity • Study of Pressure Measuring Devices • Stability of Floating Body	15
CO1-2	Q2	• Hydrostatics Force on Flat Surfaces/ Curved Surfaces • Verification of Bernoulli's Theorem	15

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

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Amity University Madhya Pradesh
B.Tech (Civil Engineering)
2022-2026
Exam Result For (Semester) : IV
Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	CIV424 FLUID MECHANICS LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U16G16
1	A60215822001	Mr RISHAV KUMAR	100	30	70	A+	10	1	1	10
2	A60215822002	Mr ADITYA BHADOURIYA	100	30	70	A	9	1	1	9
3	A60215822004	Mr SANSKAR SHARMA	100	30	70	A+	10	1	1	10
			Total No. of Students			=	3			
			Total No. of Students			>60% marks	3	100.00	%	
			Attainment Level					Level 3		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : MECHANICS OF MATERIALS
Course Code : CIV 501, Crédits : 03, Session :2023-24 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. P. Mahakavi, Mr. Sachin Tiwari

A. **Introduction:**The objective of this course is to *provide the basic concepts and principles of strength of materials.* It aims to equip the students *to give an ability to calculate stresses and deformations of objects under external loadings and also to give an ability to apply the knowledge of strength of materials on engineering applications and design problems.*

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

CIV501.1. *Understand the fundamental concepts of stress and strain*

CIV501.2. *Evaluate the problems relating to pure and uniform bending of beams and other simple structures*

CIV501.3. *Examine the deflection of beams under various loading condition.*

CIV501.4. *Understand the concept of crushing and buckling*

CIV501.5. *Analyse the structural elements using Energy methods*

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

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PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. 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.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems
PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment
PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%

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Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentt o be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves Includingmedicalleaves.	A	5%
End Semester Examinatio n	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module 1: Introduction to Stress and Strain: (8 hours)

Deformation and Strain covering description of finite deformation, Infinitesimal deformation; Analysis of statically determinate trusses; Stability of dams, retaining walls and chimneys; Stress analysis of thin, thick and compound cylinder.

Module 2: Failure Theories: (7 hours)

Generalized state of stress and strain: Stress and strain tensor, Yield criteria and theories of failure; Tresca, Von-Mises, Hill criteria, Heigh-Westerguard's stress space.

Module 3: Bending Moments Diagrams: (5 hours)

Momentum Balance and Stresses covering Forces and Moments Transmitted by Slender Members, Shear Force and Bending Moment Diagrams, Momentum Balance, Stress States / Failure Criterion.

Module 4:Determinacy and Indeterminacy of Structures: (5 hours)

Mechanics of Deformable Bodies covering Force-deformation Relationships and Static Indeterminacy, Uniaxial Loading and Material Properties, Trusses and Their Deformations, Statically Determinate and Indeterminate Trusses,

Module 5:Pressure Vessels and Torsion: (5 hours)

Force-Stress-Equilibrium covering Multiaxial Stress and Strain, Thin-walled Pressure Vessels,Stress and strain Transformations and Principal Stress, Failure of Materials. Statically Indeterminate Beams, Shear and Torsion, Torsion and Twisting.

G. 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

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H. Suggested Text/Reference Books:

- Norris, C.H. and Wilber, J. B. and Utku, S. "Elementary Structural Analysis" Mc Graw Hill, Tokyo, Japan.
- Timoshenko, S. and Young, D. H., "Elements of Strength of Materials", DVNC, New York, USA. 3. Kazmi, S. M. A., 'Solid Mechanics" TMH, Delhi, India.
- Hibbeler, R. C. Mechanics of Materials. 6th ed. East Rutherford, NJ: Pearson Prentice Hall, 2004

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Deformation	Lecture	CIV501.1	Mid Term-1, Quiz & End Sem Exam
2	Strain covering description of finite deformation,	Lecture	CIV501.1	Mid Term-1, Quiz & End Sem Exam
3	Analysis of statically determinate trusses;	Lecture	CIV501.1	Mid Term-1, Quiz & End Sem Exam
4	Stability of dams,	Lecture	CIV501.1	Mid Term-1, Quiz & End Sem Exam
5	Infinitesimal deformation;	Lecture	CIV501.1	Mid Term-1, Quiz & End Sem Exam
6	retaining walls	Lecture	CIV501.1	Mid Term-1, Quiz & End Sem Exam
7	chimneys;	Lecture	CIV501.1	Mid Term-1, Quiz & End Sem Exam
8	Stress analysis of thin and thick compound cylinder	Lecture	CIV501.1	Mid Term-1, Quiz & End Sem Exam
9	Generalized state of stress	Lecture	CIV501.2	Mid Term-1, Quiz & End Sem Exam
10	Generalized state of strain:	Lecture	CIV501.2	Mid Term-1, Quiz & End Sem Exam
11	Stress and strain tensor	Lecture	CIV501.2	Mid Term-1, Quiz & End Sem Exam
12	Yield criteria	Lecture	CIV501.2	Mid Term-1, Quiz & End Sem Exam
13	Theories of failure	Lecture	CIV501.2	Mid Term-1, Quiz & End Sem Exam
14	Tresca, Von-Mises	Lecture	CIV501.2	Mid Term-1, Quiz & End Sem Exam
15	Hill criteria	Lecture	CIV501.2	Mid Term-1, Quiz & End Sem Exam

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16	Heigh-Westerguard's stress space	Lecture	CIV501.2	Mid Term-1, Quiz & End Sem Exam
17	Momentum Balance Stresses covering Forces	Lecture	CIV501.3	Mid Term-1, Quiz & End Sem Exam
18	Moments Transmitted by Slender Members,	Lecture	CIV501.3	Mid Term-1, Quiz & End Sem Exam
19	Shear Force and Bending Moment Diagrams	Lecture	CIV501.3	Mid Term-1, Quiz & End Sem Exam
20	Momentum Balance and Stresses covering Forces	Lecture	CIV501.3	Mid Term-1, Quiz & End Sem Exam
21	Shear Force and Bending Moment Diagrams	Lecture	CIV501.3	Assignment, Quiz & End Sem Exam
22	Momentum Balance, Stress States / Failure Criterion.	Lecture	CIV501.3	Assignment, Quiz & End Sem Exam
23	Mechanics of Deformable Bodies covering Force-deformation Relationships	Lecture	CIV501.4	Assignment, Quiz & End Sem Exam
25	Static Indeterminacy	Lecture	CIV501.4	Assignment, Quiz & End Sem Exam
26	Uniaxial Loading and Material Properties	Lecture	CIV501.4	Assignment, Quiz & End Sem Exam
27	Trusses and Their Deformations	Lecture	CIV501.4	Assignment, Quiz & End Sem Exam
28	Statically Determinate and Indeterminate Trusses	Lecture	CIV501.4	Assignment, Quiz & End Sem Exam
29	Force-deformation Relationships	Lecture	CIV501.5	Assignment, Quiz & End Sem Exam
30	Force-Stress-Equilibrium	Lecture	CIV501.5	Assignment, Quiz & End Sem Exam
31	Multiaxial Stress and Strain	Lecture	CIV501.5	Assignment, Quiz & End Sem Exam
32	Thin-walled Pressure Vessels	Lecture	CIV501.5	Assignment, Quiz & End Sem Exam
33	Stress and strain Transformations	Lecture	CIV501.5	Assignment, Quiz & End Sem Exam
34	Principal Stress	Lecture	CIV501.5	Assignment, Quiz & End Sem Exam
35	Failure of Materials and Statically Indeterminate Beams	Lecture	CIV501.5	Assignment, Quiz & End Sem Exam
36	Shear, Torsion and Twisting	Lecture	CIV501.5	Assignment, Quiz

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				& End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV501.1.	Understand the fundamental concepts of stress and strain	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
CIV501.2.	Evaluate the problems relating to pure and uniform bending of beams and other simple structures	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV501.3.	Examine the deflection of beams under various loading condition.	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
CIV501.4.	Understand the concept of crushing and buckling	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
CIV501.5.	Analyse the structural elements using Energy methods.	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

Sample Question Paper

School of Engineering & Technology * Amity * Gwalior Madhya Pradesh

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Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–V) 2023-24

Class: B.Tech.(CE) V Semester

Subject Name: CIV501 Mechanics of Materials	Time: 2 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		

Student will be able to
CO1: Understand the fundamental concepts of stress and strain
CO2: Evaluate the problems relating to pure and uniform bending of beams and other simple structures

CO Map	Question No.	Question	Marks
CO1	Q.1	Explain about modulus of rigidity.	3
CO1	Q.2a	Define Shear stress and Shear strain.	3
	Q.2b	Define principal planes and principal stresses.	3
CO1	Q.3	Two vertical rods one of steel and the other of copper are each rigidly fixed at the top and 50cm apart. Diameters and lengths of each rod are 2cm and 4m respectively. A cross bar fixed to the rods at the lower ends carries a load of 5000 N such that the cross bar remains horizontal even after loading. Find the stress in each rod and the position of the load on the bar. Take E for steel = 2 x 105 N/mm2 and E for copper = 1x 105 N/mm2 .	6
CO2	Q.4	Differentiate open coiled helical spring from the close coiled helical spring and state the type of stress induced in each spring due to an axial load	3
CO2	Q.5a	Write an expression for the angle of twist for a hollow circular shaft with external diameter D, internal diameter d, length l and rigidity modulus G.	3
	Q.5b	Determine the diameter of a solid shaft which will transmit 300 KN at 250 rpm. The maximum shear stress should not exceed 30 N/mm2 and twist should not be more than 10 in a shaft length 2m. Take	3

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		modulus of rigidity = 1 x 10 5 N/mm 2 .	
CO2	Q6	List the advantages of Macaulay method over the double integration method, for finding the slope and deflections of beams?	6

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

Amity University Madhya Pradesh
B.Tech (Civil Engineering)
2021-2025
Exam Result For (Semester) : V
Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	**CIV502** HYDRAULIC ENGINEERING Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U2G2
1	A60215821003	Mr SHAD KHAN	100	30	70	B	6	2	2	12
2	A60215821004	Mr SOHAM UPADHYAY	100	30	70	B+	7	2	2	14
			Total No. of Students			=	2			
			Total No. of Students			>60% marks	0	0.00	%	
			Attainment Level					-		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : STRUCTURAL ENGINEERING
Course Code : CIV 503, Crédits : 03, Session :2023-24 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. P. Mahakavi, Mr. Sachin Tiwari

A. **Introduction:** The objective of this course is to understand the basic concepts of Limit state design and to obtain the knowledge of using Indian standard codes and special publication. It aims to equip the students to know the design concepts of all the structural members and learn economical design for materials saving and to know the design methodologies by limit state design for the beams, slabs, column and footings. The objective of this course is to learn the design of structural members such as prestress concrete members.

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

CIV503.1. Apply the usage of IS codes in design of reinforced concrete structures and Identify the types and design of beams and slabs

CIV503.2 Design the uniaxial and biaxial bending of column. and Design the simple footings and combined footings

CIV503.3 Develop skills in design of different types of steel connections

CIV503.4 Design the compression and tension member

CIV503.5 Design the prestress concrete elements

C. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

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PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. 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.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

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PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module 1: Introduction Concepts of Energy Principles: (6 Hours)

Introduction- concepts of energy principles, safety, sustainable development in performance; what makes a structure; principles of stability, equilibrium; what is a structural engineer, role of engineer, architect, user, builder; what are the functions' what do the engineers design, first principles of process of design

Module 2:Different Types of Loads on Structures: (6 Hours)

Planning and Design Process; Materials, Loads, and Design Safety; Behaviour and Properties of Concrete and Steel; Wind and Earthquake Loads.

Module 3:Structural Design Criteria: (6 Hours)

Materials and Structural Design Criteria: Introduction to the analysis and design of structural systems. Analyses of determinate and indeterminate trusses, beams, and frames, and design philosophies for structural engineering. Laboratory experiments dealing with the analysis of determinate and indeterminate structures.

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Module 4: Different Types of Structural Elements: (6 Hours)
Design of Structural Elements; Concrete Elements, Steel Elements, Structural Joints; Theories and concepts of both concrete and steel design and analysis both at the element and system levels. Approximate Analysis Methods as a Basis for Design; Design of AICTE Model Curriculum for Undergraduate degree in Civil Engineering (Engineering & Technology) 135 | Page Reinforced Concrete Beams for Flexure; Design of Reinforced Concrete Beams for Shear; Bond, Anchorage, and Serviceability; Reinforced Concrete Columns; Reinforced Concrete Slabs; Introduction to Steel Design; Tension Members and Connections; Bending Members; Structural Systems.

Module 5: Prestress Concrete Design: (6 Hours)
System Design Concepts; Special Topics that may be Covered as Part of the Design Project Discussions; Cable Structures; Prestressed Concrete Bridges; Constructability and Structural Control; Fire Protection.

G. 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

H. Suggested Text/Reference Books:

- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
- G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
- V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction- concepts of energy principles, safety	Lecture	CIV503.1	Mid Term-1, Quiz & End Sem Exam

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2	sustainable development in performance	Lecture	CIV503.1	Mid Term-1, Quiz & End Sem Exam
3	what makes a structure; principles of stability	Lecture	CIV503.1	Mid Term-1, Quiz & End Sem Exam
4	architect, user, builder;	Lecture	CIV503.1	Mid Term-1, Quiz & End Sem Exam
5	*what are the functions'*	Lecture	CIV503.1	Mid Term-1, Quiz & End Sem Exam
6	equilibrium; what is a structural engineer, role of engineer	Lecture	CIV503.1	Mid Term-1, Quiz & End Sem Exam
7	what do the engineers design, first principles of process of design	Lecture	CIV503.1	Mid Term-1, Quiz & End Sem Exam
8	Planning and Design Process	Lecture	CIV503.2	Mid Term-1, Quiz & End Sem Exam
9	Materials, Loads, and Design Safety	Lecture	CIV503.2	Mid Term-1, Quiz & End Sem Exam
10	Behaviour and Properties of Concrete	Lecture	CIV503.2	Mid Term-1, Quiz & End Sem Exam
11	Behaviour and Properties of Concrete	Lecture	CIV503.2	Mid Term-1, Quiz & End Sem Exam
12	Behaviour and Properties of Steel	Lecture	CIV503.2	Mid Term-1, Quiz & End Sem Exam
13	Wind and Earthquake Loads.	Lecture	CIV503.2	Mid Term-1, Quiz & End Sem Exam
14	Wind and Earthquake Loads.	Lecture	CIV503.2	Mid Term-1, Quiz & End Sem Exam
15	Materials and Structural Design Criteria	Lecture	CIV503.3	Mid Term-1, Quiz & End Sem Exam
16	Introduction to the analysis and design of structural systems	Lecture	CIV503.3	Mid Term-1, Quiz & End Sem Exam
17	Analyses of determinate and indeterminate trusse	Lecture	CIV503.3	Mid Term-1, Quiz & End Sem Exam
18	beams, and frames, and design philosophies for structural engineering	Lecture	CIV503.3	Mid Term-1, Quiz & End Sem Exam
19	philosophies for structural engineering	Lecture	CIV503.3	Mid Term-1, Quiz & End Sem Exam
20	analysis of determinate structures	Lecture	CIV503.3	Mid Term-1, Quiz & End Sem Exam

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21	Laboratory experiments dealing with the analysis of indeterminate structures	Lecture	CIV503.3	Assignment, Quiz & End Sem Exam
22	Design of Structural Elements; Concrete Elements, Steel Elements, Structural Joints;	Lecture	CIV503.4	Assignment, Quiz & End Sem Exam
23	Theories and concepts of both concrete and steel design and analysis both at the element and system levels	Lecture	CIV503.4	Assignment, Quiz & End Sem Exam
24	Approximate Analysis Methods as a Basis for Design	Lecture	CIV503.4	Assignment, Quiz & End Sem Exam
25	Reinforced Concrete Beams for Flexure; Design of Reinforced Concrete Beams for Shear; Bond, Anchorage, and Serviceability	Lecture	CIV503.4	Assignment, Quiz & End Sem Exam
26	Reinforced Concrete Columns; Reinforced Concrete Slabs; Introduction to Steel Design	Lecture	CIV503.4	Assignment, Quiz & End Sem Exam
27	Tension Members and Connections; Bending Members;	Lecture	CIV503.4	Assignment, Quiz & End Sem Exam
28	Structural Systems.	Lecture	CIV503.4	Assignment, Quiz & End Sem Exam
29	System Design Concepts;	Lecture	CIV503.5	Assignment, Quiz & End Sem Exam
30	Special Topics that may be Covered as Part of the Design Project Discussions;	Lecture	CIV503.5	Assignment, Quiz & End Sem Exam
31	Cable Structures;	Lecture	CIV503.5	Assignment, Quiz & End Sem Exam
32	Prestressed Concrete Bridges;	Lecture	CIV503.5	Assignment, Quiz & End Sem Exam
33	Constructability	Lecture	CIV503.5	Assignment, Quiz & End Sem Exam

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34	Structural Control;	Lecture	CIV503.5	Assignment, Quiz & End Sem Exam
35	Fire Protection.	Lecture	CIV503.5	Assignment, Quiz & End Sem Exam
36	System Design Concepts;	Lecture	CIV503.5	Assignment, Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV503.1	Apply the usage of IS codes in design of reinforced concrete structures and Identify the types and design of beams and slabs	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
CIV503.2	Design the uniaxial and biaxial bending of column. and Design the simple footings and combined footings	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV503.3	Develop skills in design of different types of steel connections	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**

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CIV503.4	Design the compression and tension member	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
CIV503.5	Design the prestress concrete elements	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–V) 2023-24						
Class: B.Tech.(CE) V Semester						
Subject Name: CIV503 Structural Engineering		Time: 2 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		

Student will be able to

CO1: Apply the usage of IS codes in design of reinforced concrete structures and Identify the types and design of beams and slabs

CO2: Design the uniaxial and biaxial bending of column. and Design the simple footings and combined footings

CO Map	Question No.	Question	Marks
CO1	Q.1	Write short note on partial safety factor.	3
CO1	Q.2a	What are the various methods of design of reinforced concrete structural elements? Explain any one in detail.	3
	Q.2b	Define characteristic strength and design strength using suitable diagram.	3

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CO1	Q.3	Describe the following in detail: (a) Steps involved in the Indian Standard recommendations for mix design (b) Behaviour of concrete under uniaxial compression. (c) Modulus of elasticity and Poisson's Ratio	6
CO2	Q.4	Write down the equation for the degree of static indeterminacy of the pin-jointed frames, Explaining the notations used..	3
CO2	Q.5a	Briefly mention the two types of matrix methods of analysis of indeterminate structure	3
	Q.5b	How would you define 'durable concrete'? Discuss the ways of ensuring durability?	3
CO2	Q6	What are the various code recommendations for the following in Limit state method: (a) Partial Safety Factors for Loads (b) Partial Safety Factors for Materials (c) Characteristic Strengths and Loads (d) Design Stress-Strain Curve for Concrete	6

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
B.Tech (Civil Engineering)
2021-2025
Exam Result For (Semester) : V
Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	CIV503 STRUCTURAL ENGINEERING							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U3G3
1	A60215821003	Mr SHAD KHAN	100	30	70	B-	5	4	4	20
2	A60215821004	Mr SOHAM UPADHYAY	100	30	70	A	9	4	4	36
			Total No. of Students			=	2			
			Total No. of Students			>60% marks	1	50.00	%	
			Attainment Level					-		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : GEOTECHNICAL ENGINEERING
Course Code : CIV 504, Crédits : 02, Session :2023-24 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Imran Ahmad Khan

A. Introduction: The objective of this course is to impart the fundamental concepts of soil mechanics and understand the bearing capacity and to understand the concept of compaction and consolidation of soils. It aims to understand the design aspects of foundation and to evaluate the stress developed in the soil medium.

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

CIV504.1*Compare the various engineering and index properties of soil.*

CIV504.2 *Explain the hydraulic conductivity of the soil and seepage actions*

CIV504.3. E*xamine the stress distribution at any point below the ground level.*

CIV504.4 *Evaluate the shear strength of the soil using Mohr Soil.*

CIV504.5 *Discuss the soil investigation techniques for advanced explorations and to conduct the field test like SPT & PLT.*

CIV504.6 *Evaluate the safe bearing capacity of shallow foundations*

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

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PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. 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.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %

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Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/H A	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentt o be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examinatio n	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module 1:Introduction–Types of Soils, Their Formation and Deposition: (3 Hours)

Introduction–Types of soils, their formation and deposition, Definitions: soil mechanics, soil engineering, rock mechanics, geotechnical engineering. Scope of soil engineering. Comparison and difference between soil and rock. Basic Definitions and Relationships- Soil as three-phase system in terms of weight, volume, voids ratio. porosity. Definitions: moisture content, unit weights, degree of saturation, voids ratio, porosity, specific gravity, mass specific gravity.

Module 2:Different Soil Properties and Relations: (4 Hours)

Plasticity Characteristics of Soil - Introduction to definitions of: plasticity of soil, consistency limits-liquid limit, plastic limit, shrinkage limit, plasticity, liquidity and consistency indices, flow & toughness indices, definitions of activity and sensitivity. Determination of: liquid limit, plastic limit and shrinkage limit. Use of consistency limits. Classification of Soils-Introduction of soil classification: particle size classification, textural classification, unified soil classification system, Indian standard soil classification system.

Module 3:Determination of Coefficient of Permeability: (4 Hours)

Permeability of Soil - Darcy's law, validity of Darcy's law. Determination of coefficient of permeability: Laboratory method: constant-head method, falling-head method. Field method: pumping- in test, pumping- out test. Permeability aspects: permeability of stratified soils, factors affecting permeability of soil. Seepage Analysis- Introduction, stream and potential functions, characteristics of flow nets.

Module 4: Stresses Coming on Soil Specimen: (4 Hours)

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Effective Stress Principle - Introduction, effective stress principle, nature of effective stress, effect of water table. Fluctuations of effective stress, effective stress in soils saturated by capillary action, seepage pressure, quick sand condition.

Module 5:Compaction of Soil: (2 Hours)
Compaction of Soil-Introduction, theory of compaction, laboratory determination of optimum moisture content and maximum dry density. Compaction in field, compaction specifications and field control.

Module 6: Consolidation of Soil: (3 Hours)
Consolidation of Soil - Introduction, comparison between compaction and consolidation, initial, primary & secondary consolidation, spring analogy for primary consolidation, interpretation of consolidation test results, Terzaghi's theory of consolidation, final settlement of soil deposits, computation of consolidation settlement and secondary consolidation. Introduction, stresses due to point load, line load, strip load, uniformly loaded circular area, rectangular loaded area. Influence factors, Isobars, Boussinesq's equation, Newmark's Influence Chart.

G. 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

H. Suggested Text/Reference Books:

- Soil Mechanics by Craig R.F., Chapman & Hall
- Fundamentals of Soil Engineering by Taylor, John Wiley & Sons
- An Introduction to Geotechnical Engineering, by Holtz R.D. and Kovacs, W.D., Prentice Hall, NJ 4. Principles of Geotechnical Engineering, by Braja M. Das, Cengage Learning
- Principles of Foundation Engineering, by Braja M. Das, Cengage Learning

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction–Types of soils, their formation and deposition	Lecture	CIV504.1	Mid Term-1, Quiz & End Sem Exam
2	Definitions: soil mechanics, soil engineering, rock	Lecture	CIV504.1	Mid Term-1, Quiz & End Sem Exam

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	mechanics, geotechnical engineering.			
3	Scope of soil engineering. Comparison and difference between soil and rock	Lecture	CIV504.1	Mid Term-1, Quiz & End Sem Exam
4	*Basic Definitions and Relationships-Soil as three-phase system in terms of weight, volume, voids ratio*	Lecture	CIV504.1	Mid Term-1, Quiz & End Sem Exam
5	Definitions: moisture content, unit weights, degree of saturation, voids ratio, porosity, specific gravity, mass specific gravity.	Lecture	CIV504.1	Mid Term-1, Quiz & End Sem Exam
6	Plasticity Characteristics of Soil - Introduction to definitions of: plasticity of soil,	Lecture	CIV504.2	Mid Term-1, Quiz & End Sem Exam
7	consistency limits-liquid limit, plastic limit, shrinkage limit, plasticity, liquidity and consistency indices, flow & toughness indices	Lecture	CIV504.2	Mid Term-1, Quiz & End Sem Exam
8	definitions of activity and sensitivity. Determination of: liquid limit, plastic limit and shrinkage limit. Use of consistency units	Lecture	CIV504.2	Mid Term-1, Quiz & End Sem Exam
9	Classification of Soils-Introduction of soil classification: particle size classification, textural classification, unified soil classification system, Indian standard soil classification system.	Lecture	CIV504.2	Mid Term-1, Quiz & End Sem Exam
10	Permeability of Soil - Darcy's law, validity of Darcy's law	Lecture	CIV504.3	Mid Term-1, Quiz & End Sem Exam
11	Determination of coefficient of permeability:	Lecture	CIV504.3	Mid Term-1, Quiz & End Sem Exam

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	Laboratory method: constant-head method, falling-head method			
12	Field method: pumping- in test, pumping- out test. Permeability aspects: permeability of stratified soils, factors affecting permeability of soil	Lecture	CIV504.3	Mid Term-1, Quiz & End Sem Exam
13	Seepage Analysis- Introduction, stream and potential functions, characteristics of flow nets.	Lecture	CIV504.3	Mid Term-1, Quiz & End Sem Exam
14	Effective Stress Principle -	Lecture	CIV504.4	Mid Term-1, Quiz & End Sem Exam
15	Introduction, effective stress principle, nature of effective stress	Lecture	CIV504.4	Mid Term-1, Quiz & End Sem Exam
16	effect of water table. Fluctuations of effective stress	Lecture	CIV504.4	Mid Term-1, Quiz & End Sem Exam
17	effective stress in soils saturated by capillary action	Lecture	CIV504.4	Mid Term-1, Quiz & End Sem Exam
18	seepage pressure, quick sand condition.	Lecture	CIV504.4	Mid Term-1, Quiz & End Sem Exam
19	Compaction of Soil- Introduction, theory of compaction	Lecture	CIV504.5	Mid Term-1, Quiz & End Sem Exam
20	laboratory determination of optimum moisture content ; maximum dry density. Compaction in field,	Lecture	CIV504.5	Mid Term-1, Quiz & End Sem Exam
21	compaction specifications and field control	Lecture	CIV504.5	Assignment, Quiz & End Sem Exam
22	Consolidation of Soil - Introduction, comparison between compaction and consolidation, initial, primary & secondary consolidation, spring analogy for primary	Lecture	CIV504.6	Assignment, Quiz & End Sem Exam

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	consolidation, interpretation of consolidation test results,			
23	Terzaghi's theory of consolidation, final settlement of soil deposits, computation of consolidation settlement and secondary consolidation. Introduction, stresses due to point load, line load, strip load, uniformly loaded circular area, rectangular loaded area	Lecture	CIV504.6	Assignment, Quiz & End Sem Exam
24	Influence factors, Isobars, Boussinesq's equation, Newmark's Influence Chart.	Lecture	CIV504.6	Assignment, Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV504.1	Compare the various engineering and index properties of soil.	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**

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CIV504.2	Explain the hydraulic conductivity of the soil and seepage actions	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV504.3.	**Examine the stress distribution at any point below the ground level.**	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
CIV504.4	**Evaluate the shear strength of the soil using Mohr Soil.**	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
CIV504.5	**Discuss the soil investigation techniques for advanced explorations and to conduct the field test like SPT & PLT.**	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**
CIV504.6	Evaluate the safe bearing capacity of shallow foundations	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–V) 2023-24						
Class: B.Tech.(CE) V Semester						
Subject Name: Civ504 Geotechnical Engineering		Time: 2 Hrs			Max.Marks:30	
Levels of the questions as per Blooms Taxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

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Question Mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		

Student will be able to

CO1: *Compare the various engineering and index properties of soil.*

CO2: Explain *the hydraulic conductivity of the soil and seepage actions*

CO Map	Question No.	Question	Marks
CO1	Q.1	Explain: Chemical weathering. Explain: Physical weathering	3
CO1	Q.2a	What do you mean by Consistency limits? What is Particle size Distribution of soil?	3
	Q.2b	What are the basic requirements of Soil Classification?	3
CO1	Q.3	Explain with neat sketches: 1. Total head, 2. Hydraulic head, 3. Hydraulic Gradient, 4. Seepage, 5. Seepage Velocity	6
CO2	Q.4	What do you mean by Quick sand condition?	3
CO2	Q.5a	Explain in detail: Piping	3
	Q.5b	Explain In detail: Darcy's Law.	3
CO2	Q6	What do you mean by Placement water Content? Describe in detail. Differentiate between Standard Proctor and Modified Proctor.	6

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
B.Tech (Civil Engineering)
2021-2025
Exam Result For (Semester) : V
Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	CIV504 GEOTECHNICAL ENGINEERING							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U4G4
1	A60215821003	Mr SHAD KHAN	100	30	70	A+	10	3	3	30
2	A60215821004	Mr SOHAM UPADHYAY	100	30	70	A+	10	3	3	30
			Total No. of Students			=	2			
			Total No. of Students			>60 % marks	2	100.00	%	
			Attainment Level					Level 3		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : Environmental Engineering – I
Course Code : CIV 506, Crédits : 03, Session : 2023-24 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : DDr. Mohan Kantharia, Dr. Imran Ahmad Khan,

A. Introduction: The objective of this course is to teach students the basic principles and concepts of unit operations and processes involved in water and wastewater treatment and to develop a student's skill in the basic design of unit operations and processes involved in water and wastewater treatment. It aims to develop a student's skill in evaluating the performance of water and wastewater treatment plants and to teach students the various methods of sludge management.

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

CIV506.1. Examine the type and size of reactor required for various unit operations and processes involved in water and wastewater treatment

CIV506.2. Able to design individual unit operation or process appropriate to the situation by applying physical, chemical, biological and engineering principles.

CIV506.3. Able to identify the type of unit operations and processes involved in water and wastewater treatment plants based on the water quality

CIV506.4. Prepare the layout of water and wastewater treatment plants and evaluate the water and wastewater treatment plants

CIV506.5. Investigate the performance of various unit operations and processes to meet the desired health and environment related goals.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

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PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. 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.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

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PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module 1:Basic water Qualities: (6 Hours)

Water: -Sources of Water and quality issues, water quality requirement for different beneficial uses, Water quality standards, water quality indices, water safety plans, Water Supply systems, Need for planned water supply schemes, Water demand industrial and agricultural water requirements, Components of water supply system; Transmission of water, Distribution system, Various valves used in W/S systems, service reservoirs and design. Water Treatment: aeration, sedimentation, coagulation flocculation, filtration, disinfection, advanced treatments like adsorption, ion exchange, membrane processes.

Module 2:Sewage and Its Disposal: (6 Hours)

Sewage- Domestic and Storm water, Quantity of Sewage, Sewage flow variations. Conveyance of sewage- Sewers, shapes design parameters, operation and maintenance of sewers, Sewage pumping; Sewerage, Sewer appurtenances, Design of sewerage systems. Small bore systems, Storm Water- Quantification and design of Storm water; Sewage and Sullage, Pollution due to improper disposal of sewage, National River cleaning plans.

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Module 3: Air Quality and Pollutants: (6 Hours)
Air - Composition and properties of air, Quantification of air pollutants, Monitoring of air pollutants, Air pollution- Occupational hazards, Urban air pollution automobile pollution, Chemistry of combustion, Automobile engines, quality of fuel, operating conditions and interrelationship. Air quality standards, Control measures for Air pollution, construction and limitations

Module 4:Solid Waste Management: (4 Hours)
Noise- Basic concept, measurement and various control methods. Government authorities and their roles in water supply, sewerage disposal. Solid waste management and monitoring/control of environmental pollution.

Module 5: Physical and Methods for Waste Management: (5 Hours)
Solid waste management-Municipal solid waste, Composition and various chemical and physical parameters of MSW, MSW management: Collection, transport, treatment and disposal of MSW. Special MSW: waste from commercial establishments and other urban areas, solid waste from construction activities, biomedical wastes, Effects of solid waste on environment: effects on air, soil, water surface and ground health hazards. Disposal of solid waste-segregation, reduction at source, recovery and recycle. Disposal methods Integrated solid waste management. Hazardous waste: Types and nature of hazardous waste as per the HW Schedules of regulating authorities.

Module 6: Home Plumbing Systems for Water Supply: (3 Hours)
Building Plumbing-Introduction to various types of home plumbing systems for water supply and waste water disposal, high rise building plumbing, Pressure reducing valves, Break pressure tanks, Storage tanks, Building drainage for high rise buildings, various kinds of fixtures and fittings used.

G. 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

H. Suggested Text/Reference Books:

Introduction to Environmental Engineering and Science by Gilbert Masters, Prentice Hall, New Jersey.
Introduction to Environmental Engineering by P. Aarne Vesilind, Susan M. Morgan, Thompson /Brooks/Cole; Second Edition 2008.

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Peavy, H.s, Rowe, D.R, Tchobanoglous, G. Environmental Engineering, Mc-Graw - Hill International Editions, New York 1985.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Water: -Sources of Water and quality issues, water quality requirement for different beneficial uses,	Lecture	CIV506.1	Mid Term-1, Quiz & End Sem Exam
2	Water quality standards, water quality indices, water safety plans, Water Supply systems, Need for planned water supply schemes	Lecture	CIV506.1	Mid Term-1, Quiz & End Sem Exam
3	Water demand industrial and agricultural water requirements, Components of water supply system; Transmission of water	Lecture	CIV506.1	Mid Term-1, Quiz & End Sem Exam
4	*Distribution system, Various valves used in W/S systems, service reservoirs and design*	Lecture	CIV506.1	Mid Term-1, Quiz & End Sem Exam
5	Water Treatment: aeration, sedimentation, coagulation flocculation	Lecture	CIV506.1	Mid Term-1, Quiz & End Sem Exam
6	filtration, disinfection, advanced treatments like adsorption, ion exchange, membrane processes.	Lecture	CIV506.1	Mid Term-1, Quiz & End Sem Exam
7	Sewage- Domestic and Storm water, Quantity of Sewage, Sewage flow variations	Lecture	CIV506.2	Mid Term-1, Quiz & End Sem Exam
8	Conveyance of sewage- Sewers, shapes design parameters, operation and maintenance of sewers	Lecture	CIV506.2	Mid Term-1, Quiz & End Sem Exam
9	Sewage pumping;	Lecture	CIV506.2	Mid Term-1, Quiz

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	Sewerage, Sewer appurtenances, Design of sewerage systems			& End Sem Exam
10	Small bore systems, Storm Water- Quantification and design of Storm water	Lecture	CIV506.2	Mid Term-1, Quiz & End Sem Exam
11	Sewage and Sullage, Pollution due to improper disposal of sewage	Lecture	CIV506.2	Mid Term-1, Quiz & End Sem Exam
12	National River cleaning plans	Lecture	CIV506.2	Mid Term-1, Quiz & End Sem Exam
13	Air - Composition and properties of air, Quantification of air pollutants	Lecture	CIV506.3	Mid Term-1, Quiz & End Sem Exam
14	Monitoring of air pollutants, Air pollution-Occupational hazards, Urban air pollution automobile pollution	Lecture	CIV506.3	Mid Term-1, Quiz & End Sem Exam
15	Chemistry of combustion, Automobile engines, quality of fuel, operating conditions and interrelationship	Lecture	CIV506.3	Mid Term-1, Quiz & End Sem Exam
16	Air quality standards, Control measures for Air pollution, construction and limitations	Lecture	CIV506.3	Mid Term-1, Quiz & End Sem Exam
17	Noise- Basic concept, measurement and various control methods.	Lecture	CIV506.4	Mid Term-1, Quiz & End Sem Exam
18	Government authorities and their roles in water supply, sewerage disposal	Lecture	CIV506.4	Mid Term-1, Quiz & End Sem Exam
19	Solid waste management and monitoring/control of environmental pollution.	Lecture	CIV506.4	Mid Term-1, Quiz & End Sem Exam
20	Solid waste management-Municipal solid waste,	Lecture	CIV506.5	Mid Term-1, Quiz & End Sem Exam
21	Composition and various chemical and physical parameters of MSW, MSW management:	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam

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22	Collection, transport, treatment and disposal of MSW.	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
23	Special MSW: waste from commercial establishments and other urban areas	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
24	solid waste from construction activities	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
25	biomedical wastes,	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
26	Effects of solid waste on environment: effects on air, soil,	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
27	water surface and ground health hazards	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
28	Disposal of solid waste-segregation	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
29	reduction at source, recovery and recycle	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
30	Disposal methods Integrated solid waste management	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
31	Hazardous waste	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
32	Types and nature of hazardous waste as per the HW Schedules of regulating authorities.	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
33	Building Plumbing-Introduction to various types of home plumbing systems for water supply and waste water disposal,	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
34	high rise building plumbing, Pressure reducing valves, Break pressure tanks,	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
35	Storage tanks, Building drainage for high rise buildings	Lecture	CIV506.5	Assignment, Quiz & End Sem Exam
36	various kinds of fixtures and fittings used	Lecture	CIV506.5	Assignment, 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		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV506.1.	Examine the type and size of reactor required for various unit operations and processes involved in water and wastewater treatment	3	2	3	1	2	-	1	-	3	2	3	3	**3**	**2**	**1**
CIV506.2.	Able to design individual unit operation or process appropriate to the situation by applying physical, chemical, biological and engineering principles.	3	3	2	2	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV506.3.	Able to identify the type of unit operations and processes involved in water and wastewater treatment plants based on the water quality	3	3	2	2	3	-	1	2	-	2	3	3	**2**	**2**	**1**

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CIV506.4.	Prepare the layout of water and wastewater treatment plants and evaluate the water and wastewater treatment plants	3	3	2	1	1	2	1	-	1	2	3	3	**3**	**2**	**1**
CIV506.5.	Investigate the performance of various unit operations and processes to meet the desired health and environment related goals	3	3	2	3	3	2	2	-	2	2	3	3	**3**	**2**	**3**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–V) 2023-24						
Class: B.Tech.(CE) V Semester						
Subject Name: CIV506 Environmental Engineering - I		Time: 2 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		
Student will be able to CO1: Examine the type and size of reactor required for various unit operations and processes involved in water and wastewater treatment						

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CO2: Able to design individual unit operation or process appropriate to the situation by applying physical, chemical, biological and engineering principles.

CO Map	Question No.	Question	Marks
CO1	Q.1	What is Design period? List any two factors influencing it?	3
CO1	Q.2a	State any two water quality parameters that can be analysed by titrometric method?	3
	Q.2b	State the purpose of carrying out water quality characterization?	3
CO1	Q.3	Explain the different methods of forecasting the future population of a town clearly bringing out their relative merits?	6
CO2	Q.4	Distinguish between shallow well and deep well.	3
CO2	Q.5a	What is Sustainable Development?	3
	Q.5b	Distinguish between confined and unconfined aquifier?	3
CO2	Q6	Explain the various sources of surface and groundwater.	6

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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B.Tech (Civil Engineering)
2021-2025
Exam Result For (Semester) : V
Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	CIV506 ENVIRONMENTAL ENGINEERING – I							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U5G5
1	A60215821003	Mr SHAD KHAN	100	30	70	A	9	3	3	27
2	A60215821004	Mr SOHAM UPADHYAY	100	30	70	A	9	3	3	27
			Total No. of Students			=	2			
			Total No. of Students			>60 % marks	2	100.00	%	
			Attainment Level					Level 3		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : HYDRAULIC ENGINEERING LAB
Course Code : CIV 522, Crédits : 02, Session :2023-24 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. Sachin Tiwari

A. Introduction**:** T*he objective of this course is to To introduce the students to various hydraulic engineering problems like open channel flows and hydraulic machines. At the completion of the course, the student should be able to relate the theory and practice of problems in hydraulic engineering*

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

CIV522.1. Analyse various hydraulic systems by applying the fundamental laws of fluid statics.

CIV522.2. Solve the fluid flow governing equations by taking suitable constraints and assumptions

CIV522.3. Evaluate major and minor losses in pipes

CIV522.4. Analyse the practical significance of open channel flows 5. Perform dimensional analysis on any real life problems

CIV522.5. Interpret the boundary layer aspects of laminar and turbulent flows and experimentally determine the fluid properties and flow parameters using various experimental setups.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

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PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. 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.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

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E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Practical Work:

i. Flow Visualization**: (2 Hours)**
ii. Studies in Wind Tunnel**: (2 Hours)**
iii. Boundary Layer**: (2 Hours)**
iv. Flow around an Aerofoil / circular cylinder**: (2 Hours)**
v. Uniform Flow**: (2 Hours)**
vi. Velocity Distribution in Open channel flow**: (2 Hours)**
vii. Venturi Flume**,** Standing Wave, Flume**: (2 Hours)**
viii. Gradually Varied Flow, Flow through pipes**: (2 Hours)**
ix. Turbulent flow through pipes**: (2 Hours)**
x. Flow visualization**: (2 Hours)**

G. Examination Scheme:

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Components	IA				EE	
	A	PR	LR	V	PR	V
Weightage (%)	5	10	10	5	35	35

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

H. Suggested Text/Reference Books:

- Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard Book House
- Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
- Open channel Flow, K. Subramanya, Tata McGraw Hill.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Flow Visualization	Lecture	CIV522.1	Internal Assessment, Viva &External Exam
2	Flow Visualization	Lecture	CIV522.1	Internal Assessment, Viva &External Exam
3	Studies in Wind Tunnel:	Lecture	CIV522.1	Internal Assessment, Viva &External Exam
4	Studies in Wind Tunnel:	Lecture	CIV522.1	Internal Assessment, Viva &External Exam
5	Boundary Layer	Lecture	CIV522.2	Internal Assessment, Viva &External Exam
6	*Boundary Layer*	Lecture	CIV522.2	Internal Assessment, Viva &External Exam
7	*Flow around an Aerofoil / circular cylinder*	Lecture	CIV522.2	Internal Assessment, Viva &External Exam
8	Flow around an Aerofoil / circular cylinder	Lecture	CIV522.2	Internal Assessment, Viva &External Exam
9	Uniform Flow	Lecture	CIV522.3	Internal

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				Assessment, Viva &External Exam
10	Uniform Flow	Lecture	CIV522.3	Internal Assessment, Viva &External Exam
11	Velocity Distribution in Open channel flow	Lecture	CIV522.3	Internal Assessment, Viva &External Exam
12	Velocity Distribution in Open channel flow	Lecture	CIV522.3	Internal Assessment, Viva &External Exam
13	Venturi Flume, Standing Wave, Flume	Lecture	CIV522.3	Internal Assessment, Viva &External Exam
14	Venturi Flume, Standing Wave, Flume	Lecture	CIV522.3	Internal Assessment, Viva &External Exam
15	Gradually Varied Flow,	Lecture	CIV522.4	Internal Assessment, Viva &External Exam
16	Gradually Varied Flow,	Lecture	CIV522.4	Internal Assessment, Viva &External Exam
17	Turbulent flow through pipes	Lecture	CIV522.4	Internal Assessment, Viva &External Exam
18	Turbulent flow through pipes	Lecture	CIV522.4	Internal Assessment, Viva &External Exam
19	Flow visualization:	Lecture	CIV522.4	Internal Assessment, Viva &External Exam
20	Flow visualization:	Lecture	CIV522.4	Internal Assessment, Viva &External Exam
21	Venturi Flume, Standing Wave, Flume	Lecture	CIV522.5	Internal Assessment, Viva &External Exam
22	Flow through pipes:	Lecture	CIV522.5	Internal Assessment, Viva &External Exam
23	Flow through pipes:	Lecture	CIV522.5	Internal

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				Assessment, Viva &External Exam
24	Flow around an Aerofoil / circular cylinder	Lecture	CIV522.5	Internal Assessment, Viva &External Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV522.1.	CIV522.1. Analyse various hydraulic systems by applying the fundamental laws of fluid statics.	3	3	2	2	3	-	1	2	-	2	3	3	**2**	**2**	**1**
CIV522.2	CIV522.2. Solve the fluid flow governing equations by taking suitable constraints and assumptions	3	3	2	1	1	2	1	-	1	2	3	3	**3**	**2**	**1**
CIV522.3.	CIV522.3. Evaluate major and minor losses in pipes	3	3	2	2	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV522.4.	Analyse the practical significance of open channel flows 5. Perform dimensional analysis on any real life problems	3	3	2	3	3	2	2	-	2	2	3	3	**3**	**2**	**3**
CIV522.5.	*Interpret the boundary layer aspects of laminar and*	3	2	3	1	2	-	1	-	3	2	3	3	**3**	**2**	**1**

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	turbulent flows and experimentally determine the fluid properties and flow parameters using various experimental setups.														

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–V) 2023-24						
Class: B.Tech.(CE) V Semester						
Subject Name: CIV522 Hydraulics Engineering Lab		Time: 2 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		
Student will be able to *CO1:* Analyse various hydraulic systems by applying the fundamental laws of fluid statics and CO2. Solve the fluid flow governing equations by taking suitable constraints and assumptions						
CO Map	Question No.	Question				Marks

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CO1	Q.1	Define open channel flow with examples.	3
CO1	Q.2a	.Distinguish between critical, sub critical and subcritical flows.	3
	Q.2b	Differentiate prismatic and non-prismatic channels.	3
CO1	Q.3	Calculate the Specific energy ,Critical depth and the velocity of the flow of 10 m 3 in a cement lined rectangular channel 2.5m wide with 2 m depth of water. Is the given flow is sub critical or super critical	6
CO2	Q.4	List the factors affecting Manning"s roughness coefficient.	3
CO2	Q.5a	What are the condition for obtaining most economical circular channel section for maximum velocity and discharge?	3
	Q.5b	A channel is designed to carry a discharge of 20 m 3 /s with Manning"s n = 0.015 and bed slope of 1 in 1000 (for trapezoidal channel side slope M = 1/3). Find the channel dimensions of the most efficient section if the channel is (i) trapezoidal (ii) rectangular.	3
CO2	Q6	A V – shaped open channel of included angle 90° conveys a discharge of 0.05 m 3 /s when the depth of flow at the center is 0.225 m. Assuming that C = 50 m 1/2 /s in the Chezy"s equation, calculate the slope of the channel.	6

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

Amity University Madhya Pradesh
B.Tech (Civil Engineering)
2021-2025
Exam Result For (Semester) : V
Institute : Amity School of Engineering and Technology, Gwalior

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S. No.	Enrollment.No.	Student's Name	CIV522 HYDRAULIC ENGINEERING LAB Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U6G6
1	A60215821003	Mr SHAD KHAN	100	30	70	A	9	1	1	9
2	A60215821004	Mr SOHAM UPADHYAY	100	30	70	A+	10	1	1	10
			Total No. of Students			=	2			
			Total No. of Students			>60 % marks	2	100.00	%	
			Attainment Level					Level 3		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : GEOTECHNICAL ENGINEERING LAB
Course Code : CIV 524, Crédits : 02, Session :2023-24 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Imran Ahmad Khan

A. **Introduction:** The objective of this course is *to* introduce basic soil properties and their significance to the students and to have a understanding of different soil properties and their uses in engineering..

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

CIV524.1. *To impart the fundamental concepts of soil mechanics and understand the bearing capacity*

CIV524.2. *To understand the concept of compaction and consolidation of soils*

CIV524.3. *To understand the design aspects of foundation*

CIV524.4. *To evaluate the stress developed in the soil medium*

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. 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.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance	A	5%

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	isrequiredtobemaintainedbyastudentt o be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.		
End Semester Examinatio n	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Practical Work:

1. Field Density using Core Cutter method**: (1 Hour)**
2. Field Density using Sand replacement method**:(1 Hour)**
3. Natural moisture content using Oven Drying method**:(1 Hour)**
4. Field identification of Fine Grained soils**:(1 Hour)**
5. Specific gravity of Soils**:(1 Hour)**
6. Grain size distribution by Sieve Analysis**:(1 Hour)**
7. Grain size distribution by Hydrometer Analysis**:(2 Hours)**
8. Consistency limits by Liquid limit**:(2 Hours)**
9. Consistency limits by Plastic limit**:(2 Hours)**
2. Consistency limits by Shrinkage limit**:(2 Hours)**
3. Permeability test using Constant-head test method**:(2 Hours)**
4. Permeability test using Falling-head. Triaxial Test (UU) **:(2 Hours)**
5. Vane Shear Test**:(1 Hours)**
6. Direct Shear Test**:(1 Hours)**

G. Examination Scheme:

Components	**IA**				**EE**	
	A	**PR**	**LR**	**V**	**PR**	**V**
Weightage (%)	**5**	**10**	**10**	**5**	**35**	**35**

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Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

H. Suggested Text/Reference Books:

- Soil Mechanics by Craig R.F., Chapman & Hall
- Fundamentals of Soil Engineering by Taylor, John Wiley & Sons
- An Introduction to Geotechnical Engineering, by Holtz R.D. and Kovacs, W.D., Prentice Hall, NJ

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Field Density using Core Cutter method:	Lecture	CIV524.1	Internal Assessment, Viva &External Exam
2	Field Density using Core Cutter method:	Lecture	CIV524.1	Internal Assessment, Viva &External Exam
3	Field Density using Sand replacement method:	Lecture	CIV524.1	Internal Assessment, Viva &External Exam
4	Field Density using Sand replacement method:	Lecture	CIV524.1	Internal Assessment, Viva &External Exam
5	Natural moisture content using Oven Drying method:	Lecture	CIV524.2	Internal Assessment, Viva &External Exam
6	Natural moisture content using Oven Drying method:	Lecture	CIV524.2	Internal Assessment, Viva &External Exam
7	*Field identification of Fine Grained soils:*	Lecture	CIV524.2	Internal Assessment, Viva &External Exam
8	Field identification of Fine Grained soils:	Lecture	CIV524.2	Internal Assessment, Viva &External Exam
9	Specific gravity of Soils	Lecture	CIV524.3	Internal Assessment, Viva

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				&External Exam
10	Specific gravity of Soils	Lecture	CIV524.3	Internal Assessment, Viva &External Exam
11	Grain size distribution by Sieve Analysis	Lecture	CIV524.3	Internal Assessment, Viva &External Exam
12	Grain size distribution by Sieve Analysis	Lecture	CIV524.3	Internal Assessment, Viva &External Exam
13	Grain size distribution by Hydrometer Analysis:	Lecture	CIV524.3	Internal Assessment, Viva &External Exam
14	Grain size distribution by Hydrometer Analysis:	Lecture	CIV524.3	Internal Assessment, Viva &External Exam
15	Consistency limits by Liquid limit	Lecture	CIV524.4	Internal Assessment, Viva &External Exam
16	Consistency limits by Liquid limit	Lecture	CIV524.4	Internal Assessment, Viva &External Exam
17	Consistency limits by Plastic limit:	Lecture	CIV524.4	Internal Assessment, Viva &External Exam
18	Consistency limits by Plastic limit:	Lecture	CIV524.4	Internal Assessment, Viva &External Exam
19	Consistency limits by Shrinkage limit:	Lecture	CIV524.4	Internal Assessment, Viva &External Exam
20	Consistency limits by Shrinkage limit:	Lecture	CIV524.4	Internal Assessment, Viva &External Exam
21	Permeability test using Constant-head test method:	Lecture	CIV524.4	Internal Assessment, Viva &External Exam
22	Permeability test using Falling-head. Triaxial Test (UU) :	Lecture	CIV524.4	Internal Assessment, Viva &External Exam
23	Vane Shear Test	Lecture	CIV524.4	Internal Assessment, Viva

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				&External Exam
24	Direct Shear Test:	Lecture	CIV524.4	Internal Assessment, Viva &External Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV524.1.	*To impart the fundamental concepts of soil mechanics and understand the bearing capacity*	3	3	1	3	1	**3**	**2**	-	2		2	1	**3**	**1**	**2**
CIV524.2.	*To understand the concept of compaction and consolidation of soils*	3	2	2	2	2	**1**	-	-	2		1	1	**1**	**1**	**3**
CIV524.3.	*To understand the design aspects of foundation*	3	2	2	2	2	**1**	-	**1**	3		3	1	**3**	**3**	**2**
CIV524.4.	*To evaluate the stress developed in the soil medium*	3	3	2	3	2	-	-	-	1		2	1	**1**	**2**	**2**

Sample Question Paper

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Amity School of Engineering and Technology
Department of Civil Engineering
I MID-SEMESTER (SEM–V) 2023-24

Class: B.Tech.(CE) V Semester

Subject Name: Civ524 Geotechnical Engineering Lab	Time: 2 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		

Student will be able to

CO1: *Compare the various engineering and index properties of soil.*

CO2: Explain *the hydraulic conductivity of the soil and seepage actions*

CO Map	Question No.	Question	Marks
CO1	Q.1	Describe in detail: Soil Formation in Geological cycle	3
CO1	Q.2a	Define following terms: 1. Water content of soil, 2. Bulk unit weight, 3. Specific Gravity, 4. Void ratio, 5. Density Index	3
	Q.2b	What are the basic requirements of Soil Classification?	3
CO1	Q.3	What do you mean by Compaction? Explain theory of Compaction. List out all factors affecting Compaction. Explain each in detail.	6
CO2	Q.4	Differentiate between Standard Proctor and Modified Proctor	3
CO2	Q.5a	Explain: Effects of Compaction on Properties of Soil.	3
	Q.5b	What are the different methods of Compaction used in field? Explain each in detail	3
CO2	Q6	What are the different methods of Compaction used in field? Explain each in detail	6

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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

Amity University Madhya Pradesh
B.Tech (Civil Engineering)
2021-2025
Exam Result For (Semester) : V
Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	CIV524 GEOTECHNICAL ENGINEERING LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U7G7
1	A60215821003	Mr SHAD KHAN	100	30	70	A+	10	1	1	10
2	A60215821004	Mr SOHAM UPADHYAY	100	30	70	A+	10	1	1	10
			Total No. of Students			=	2			
			Total No. of Students			>60 % marks	2	100.00	%	
			Attainment Level					Level 3		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : TRANSPORTATION ENGINEERING
Course Code : CIV 507, Crédits : 02, Session :2023-24 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Ripunjoy Gogoi, Dr. P. Mahakavi

A. Introduction: The objective of this course is to expose the students with various transportation modes and their advantages and disadvantages and to facilitate students to decide highway alignment and design highway geometry. It aims to enable students to select suitable materials for highway pavements and design the pavement and to explain students with various components of a railway track.

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

CIV507.1. Classify basic design of highway geometry according to the design specifications.

CIV507.2. Design a flexible pavement using IRC method and Describe various components of railways and their functions.

CIV507.3. Design a railway geometry according to the design specifications.

CIV507.4. Classify various components of an airport and identify the alignment and the required length of a runway.

CIV507.5. Identify various components of a harbor and their functions.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

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PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. 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.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

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PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module 1:Highway Planning: (4 Hours)
Highway development and planning-Classification of roads, road development in India, Current road projects in India; highway alignment and project preparation.

Module 2:Geometric Properties of Highway: (4 Hours)
Geometric design of highways-: Introduction; highway cross section elements; sight distance, design of horizontal alignment; design of vertical alignment; design of intersections, problems

Module 3: Traffic Engineering & Control: (4 Hours)
Traffic engineering & control- Traffic Characteristics, traffic engineering studies, traffic flow and capacity, traffic regulation and control; design of road intersections; design of parking facilities; highway lighting; problems

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Module 4:Pavement Design: (4 Hours)
Pavement materials- Materials used in Highway Construction- Soils, Stone aggregates, bituminous binders, bituminous paving mixes; Portland cement and cement concrete: desirable properties, tests, requirements for different types of pavements. Problems

Module 5:Flexible and IRC Guidelines: (4 Hours)
Design of pavements- Introduction; flexible pavements, factors affecting design and performance; stresses in flexible pavements; design of flexible pavements as per IRC; rigid pavements- components and functions; factors affecting design and performance of CC pavements; stresses in rigid pavements; design of concrete pavements as per IRC; problems.

G. 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

H. Suggested Text/Reference Books:

- Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Revised 10th Edition, Nem Chand & Bros, 2017
- Kadiyalai, L.R., ' Traffic Engineering and Transport Planning', Khanna Publishers.
- Partha Chakraborty, ' Principles Of Transportation Engineering, PHI Learning,

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Highway development and planning	Lecture	CIV507.1	Mid Term-1, Quiz & End Sem Exam
2	Classification of roads, road development in India,	Lecture	CIV507.1	Mid Term-1, Quiz & End Sem Exam
3	Current road projects in India	Lecture	CIV507.1	Mid Term-1, Quiz & End Sem Exam
4	*highway alignment and project preparation*	Lecture	CIV507.1	Mid Term-1, Quiz & End Sem Exam
5	Geometric design of highways	Lecture	CIV507.2	Mid Term-1, Quiz & End Sem Exam
6	Introduction; highway cross section elements	Lecture	CIV507.2	Mid Term-1, Quiz & End Sem Exam
7	sight distance, design of	Lecture	CIV507.2	Mid Term-1, Quiz

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	horizontal alignment			& End Sem Exam
8	design of vertical alignment	Lecture	CIV507.2	Mid Term-1, Quiz & End Sem Exam
9	; design of intersections, problems	Lecture	CIV507.2	Mid Term-1, Quiz & End Sem Exam
10	Traffic engineering & control	Lecture	CIV507.3	Mid Term-1, Quiz & End Sem Exam
11	Traffic Characteristics, traffic engineering studies	Lecture	CIV507.3	Mid Term-1, Quiz & End Sem Exam
12	traffic flow and capacity	Lecture	CIV507.3	Mid Term-1, Quiz & End Sem Exam
13	traffic regulation and control	Lecture	CIV507.3	Mid Term-1, Quiz & End Sem Exam
14	design of road intersections	Lecture	CIV507.3	Mid Term-1, Quiz & End Sem Exam
15	design of parking facilities; highway lighting; problems	Lecture	CIV507.3	Mid Term-1, Quiz & End Sem Exam
16	Pavement materials	Lecture	CIV507.4	Mid Term-1, Quiz & End Sem Exam
17	Materials used in Highway Construction	Lecture	CIV507.4	Mid Term-1, Quiz & End Sem Exam
18	Soils, Stone aggregates	Lecture	CIV507.4	Mid Term-1, Quiz & End Sem Exam
19	bituminous binders, bituminous paving mixes;	Lecture	CIV507.4	Mid Term-1, Quiz & End Sem Exam
20	Portland cement and cement concrete: desirable properties,	Lecture	CIV507.4	Mid Term-1, Quiz & End Sem Exam
21	tests, requirements for different types of pavements. Problems	Lecture	CIV507.4	Assignment, Quiz & End Sem Exam
22	Design of pavements- Introduction; flexible pavements, factors affecting design and performance; stresses in flexible pavements	Lecture	CIV507.5	Assignment, Quiz & End Sem Exam
23	design of flexible pavements as per IRC; rigid pavements- components and functions; factors	Lecture	CIV507.5	Assignment, Quiz & End Sem Exam

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	affecting design and performance of CC pavements			
24	stresses in rigid pavements; design of concrete pavements as per IRC; problems.	Lecture	CIV507.5	Assignment, Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV507.1.	Classify basic design of highway geometry according to the design specifications.	3	3	2	2	3	-	1	2	-	2	3	3	**2**	**2**	**1**
CIV507.2.	Design a flexible pavement using IRC method and Describe various components of railways and their functions.	3	3	2	1	1	2	1	-	1	2	3	3	**3**	**2**	**1**
CIV507.3.	Design a railway geometry according to the design specifications.	3	3	2	3	3	2	2	-	2	2	3	3	**3**	**2**	**3**
CIV507.4.	Classify various components of an airport and identify the alignment and the required length of a runway.	3	2	3	1	2	-	1	-	3	2	3	3	**3**	**2**	**1**

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CIV507.5.	Identify various components of a harbor and their functions.	3	3	2	2	3	2	2	-	3	2	3	3	**3**	**1**	**2**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–V) 2023-24						
Class: B.Tech.(CE) V Semester						
Subject Name: CIV507 TRANSPORTATION ENGINEERING		Time: 2 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		
Student will be able to CO1: Classify basic design of highway geometry according to the design specifications. **CO2:** Design a flexible pavement using IRC method and Describe various components of railways and their functions.						

CO Map	Question No.	Question	Marks
CO1	Q.1	Discuss about maximum wheel load	3
CO1	Q.2a	How the excavation is done in highway construction?	3
	Q.2b	Derive an expression of summit curve for SSD	3
CO1	Q.3	Explain spot speed, running sped, space mean speed, time mean speed and average speed. How is spot speed studies carried out?	6
CO2	Q.4	Evaluate grain size analysis on highway materials.	3

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CO2	Q.5a	Write a short note on setting out of a transition curve.	3
	Q.5b	Explain the role of kerb.	3
CO2	Q6	Explain briefly three different tests carried out to determine the abrasion of aggregates	6

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

Amity University Madhya Pradesh
B.Tech (Civil Engineering)
2021-2025
Exam Result For (Semester) : V
Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	**CIV507** TRANSPORTATION ENGINEERING							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U11G11
1	A60215821003	Mr SHAD KHAN	100	30	70	B+	7	3	3	21
2	A60215821004	Mr SOHAM UPADHYAY	100	30	70	A	9	3	3	27
			Total No. of Students			=	2			
			Total No. of Students			>60 % marks	1	50.00	%	
			Attainment Level					-		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : HYDROLOGY & WATER RESOURCES ENGINEERING
Course Code : CIV 505 Crédits : 03, Session :2023-24 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. Sachin Tiwari

A. Introduction: The objective of this course is *to motivate the students to identify, formulate, solve the complex problem to manage the water resource related issues and to prepare the students to synthesize data and technical concepts to apply in water resources engineering. It aims to develop the ability of the students to conduct appropriate experiments, analyse and interpret data and use engineering judgement to draw conclusions in water resources problems.*

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

CIV505.1. Identify the various components of hydrological cycle and the spatial and temporal variation of rainfall.
CIV505.2. Determine the different methods and hydrological models to estimate the stream flow.
CIV505.3. Examine the different techniques to calculate the probable maximum flood based on different returned period.
CIV505.4. Evaluate the basic aquifer parameters and groundwater resources for different hydro geological boundary conditions.
CIV505.5. Understand the different methods of irrigation and find the optimum methods of irrigation for judicious use of water resources.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs

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with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. 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.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

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PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module 1:Introduction to Hydrology: (5 Hours)
Introduction - hydrologic cycle, water-budget equation, history of hydrology, world water balance, applications in engineering, sources of data**.**

Module 2:Different Forms of Precipitation: (5 Hours)
Precipitation - forms of precipitation, characteristics of precipitation in India, measurement of precipitation, rain gauge network, mean precipitation over an area, deptharea-duration relationships, maximum intensity/depth-duration-frequency relationship, Probable Maximum Precipitation (PMP), rainfall data in India.

Module 3:Different Methods for Rainfall Calculation: (7 Hours)

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Abstractions from precipitation - evaporation process, evaporimeters, analytical methods of evaporation estimation, reservoir evaporation and methods for its reduction, evapotranspiration, measurement of evapotranspiration, evapotranspiration equations, potential evapotranspiration over India, actual evapotranspiration, interception, depression storage, infiltration, infiltration capacity, measurement of infiltration, modelling infiltration capacity, classification of infiltration capacities, infiltration indices.

Module 4: SCS-CN Method of Estimating Runoff: (6 Hours)
Runoff - runoff volume, SCS-CN method of estimating runoff volume, flow duration curve, flow-mass curve, hydrograph, factors affecting runoff hydrograph, components of hydrograph, base flow separation, effective rainfall, unit hydrograph surface water resources of India, environmental flows.

Module 5:Ground Water and Well Hydrology: (7 Hours)
Ground water and well hydrology - forms of subsurface water, saturated formation, aquifer properties, geologic formations of aquifers, well hydraulics: steady state flow in wells, equilibrium equations for confined and unconfined aquifers, aquifer tests. Design of channels- rigid boundary channels, alluvial channels, Kennedy's and Lacey's theory of regime channels. Water logging: causes, effects, consumptive use, irrigation requirement, frequency of irrigation; Methods of applying water to the fields: surface, sub-surface, sprinkler and trickle / drip irrigation.

G. 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

H. Suggested Text/Reference Books:

- K Subramanya, Engineering Hydrology, Mc-Graw Hill.
- K N Muthreja, Applied Hydrology, Tata Mc-Graw Hill.
- K Subramanya, Water Resources Engineering through Objective Questions, Tata McGraw Hill.
- G L Asawa, Irrigation Engineering, Wiley Eastern

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction - hydrologic cycle,	Lecture	CIV505.1	Mid Term-1, Quiz & End Sem Exam
2	water-budget equation,	Lecture	CIV505.1	Mid Term-1, Quiz

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				& End Sem Exam
3	history of hydrology,	Lecture	CIV505.1	Mid Term-1, Quiz & End Sem Exam
4	*world water balance,*	Lecture	CIV505.1	Mid Term-1, Quiz & End Sem Exam
5	applications in engineering, sources of data**.**	Lecture	CIV505.1	Mid Term-1, Quiz & End Sem Exam
6	Precipitation - forms of precipitation, characteristics of precipitation in India	Lecture	CIV505.1	Mid Term-1, Quiz & End Sem Exam
7	measurement of precipitation	Lecture	CIV505.1	Mid Term-1, Quiz & End Sem Exam
8	rain gauge network, mean precipitation over an area	Lecture	CIV505.2	Mid Term-1, Quiz & End Sem Exam
9	deptharea-duration relationships	Lecture	CIV505.2	Mid Term-1, Quiz & End Sem Exam
10	maximum intensity/depth	Lecture	CIV505.2	Mid Term-1, Quiz & End Sem Exam
11	duration-frequency relationship	Lecture	CIV505.2	Mid Term-1, Quiz & End Sem Exam
12	Probable Maximum Precipitation (PMP),	Lecture	CIV505.2	Mid Term-1, Quiz & End Sem Exam
13	rainfall data in India.	Lecture	CIV505.2	Mid Term-1, Quiz & End Sem Exam
14	Abstractions from precipitation - evaporation process	Lecture	CIV505.2	Mid Term-1, Quiz & End Sem Exam
15	evaporimeters, analytical methods of evaporation estimation,	Lecture	CIV505.3	Mid Term-1, Quiz & End Sem Exam
16	Reservoir evaporation and methods for its reduction	Lecture	CIV505.3	Mid Term-1, Quiz & End Sem Exam
17	evapotranspiration, measurement of evapotranspiration, evapotranspiration	Lecture	CIV505.3	Mid Term-1, Quiz & End Sem Exam
18	potential evapotranspiration over India,	Lecture	CIV505.3	Mid Term-1, Quiz & End Sem Exam
19	actual evapotranspiration, interception	Lecture	CIV505.3	Mid Term-1, Quiz & End Sem Exam

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20	depression storage, infiltration, infiltration capacity, measurement of infiltration,	Lecture	CIV505.3	Mid Term-1, Quiz & End Sem Exam
21	modelling infiltration capacity, classification of infiltration capacities, infiltration indices	Lecture	CIV505.3	Assignment, Quiz & End Sem Exam
22	Runoff - runoff volume,	Lecture	CIV505.4	Assignment, Quiz & End Sem Exam
23	SCS-CN method of estimating runoff volume	Lecture	CIV505.4	Assignment, Quiz & End Sem Exam
24	flow duration curve, flow-mass curve	Lecture	CIV505.4	Assignment, Quiz & End Sem Exam
25	hydrograph, factors affecting runoff hydrograph	Lecture	CIV505.4	Assignment, Quiz & End Sem Exam
26	components of hydrograph, base flow separation	Lecture	CIV505.4	Assignment, Quiz & End Sem Exam
27	effective rainfall,	Lecture	CIV505.4	Assignment, Quiz & End Sem Exam
28	unit hydrograph surface water resources of India	Lecture	CIV505.4	Assignment, Quiz & End Sem Exam
29	Ground water and well hydrology - forms of subsurface water	Lecture	CIV505.5	Assignment, Quiz & End Sem Exam
30	saturated formation, aquifer properties, geologic formations of aquifers, well hydraulics: steady state flow in wells,	Lecture	CIV505.5	Assignment, Quiz & End Sem Exam
31	equilibrium equations for confined and unconfined aquifers, aquifer tests. Design of channels- rigid boundary channels, alluvial channels	Lecture	CIV505.5	Assignment, Quiz & End Sem Exam
32	Kennedy's and Lacey's theory of regime channels. Water logging: causes, effects, consumptive use, irrigation requirement,	Lecture	CIV505.5	Assignment, Quiz & End Sem Exam

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33	frequency of irrigation; Methods of applying water to the fields	Lecture	CIV505.5	Assignment, Quiz & End Sem Exam
34	surface, sub-surface	Lecture	CIV505.5	Assignment, Quiz & End Sem Exam
35	sprinkler and trickle / drip irrigation.	Lecture	CIV505.5	Assignment, Quiz & End Sem Exam
36	sprinkler and trickle / drip irrigation.	Lecture	CIV505.5	Assignment, Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV505.1.	Identify the various components of hydrological cycle and the spatial and temporal variation of rainfall.	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
CIV505.2.	Determine the different methods and hydrological models to estimate the stream flow.	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV505.3.	Examine the different techniques to calculate the probable maximum flood based on	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**

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	different returned period.															
CIV505.4	Evaluate the basic aquifer parameters and groundwater resources for different hydro geological boundary conditions.	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
CIV505.5.	Understand the different methods of irrigation and find the optimum methods of irrigation for judicious use of water resources.	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–V) 2023-24						
Class: B.Tech.(CE) V Semester						
Subject Name: CIV505 Hydrology & Water Resources Engineering		Time: 2 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		

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Student will be able to

CO1: . Identify the various components of hydrological cycle and the spatial and temporal variation of rainfall.

CO2: Determine the different methods and hydrological models to estimate the stream flow.

CO Map	Question No.	Question	Marks
CO1	Q.1	Distinguish between continental air mass and maritime air mass?	3
CO1	Q.2a	What are the basic data required for hydrological studies?	3
	Q.2b	What is meant by Probable Maximum Precipitation (PMP) over a basin?	3
CO1	Q.3	Describe the working principle of a non-recording type rain gauge with neat sketch, Mentioning its advantages and disadvantages.	6
CO2	Q.4	State Darcy‟s law	3
CO2	Q.5a	Distinguish between steam flow and runoff	3
	Q.5b	Why Rainfall-Runoff relationship is necessary? Justify	3
CO2	Q6	Two lake P-with surface evaporation 32.4m and Q -with surface evaporation 28.4m 1400m away are separated by land lying on an impervious layer with an elevation of 24.4m.determine the flow between the lakes taking the permeability as 34.4 m/day. Neglect the infiltration loss.	6

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

Amity University Madhya Pradesh

B.Tech (Civil Engineering)

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Amity University Madhya Pradesh Gwalior

2021-2025

Exam Result For (Semester) : V

Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	CIV505 HYDROLOGY & WATER RESOURCES ENGINEERING							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U12G12
1	A60215821003	Mr SHAD KHAN	100	30	70	A+	10	3	3	30
2	A60215821004	Mr SOHAM UPADHYAY	100	30	70	A+	10	3	3	30
			Total No. of Students			=	2			
			Total No. of Students			>60 % marks	2	100.00	%	
			Attainment Level					Level 3		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : TRANSPORTATION ENGINEERING LAB
Course Code : CIV 527, Crédits : 02, Session :2023-24 (Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Ripunjoy Gogoi, Dr. P. Mahakavi

A. Introduction: The objective of this course is to impart knowledge about different geometric properties of highway and different highway materials used in the construction..

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

CIV527.1. Understand the properties of materials used for construction of highways and airports.

CIV527.2. Understand the transportation characteristics, operations, design, planning, and maintenance.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. 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.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/H A	10%

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Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

i. Los Angles Abrasion Test**: (2 Hours)**
ii. Crushing test**: (2 Hours)**
iii. Impact test for aggregates**: (2 Hours)**
iv. Elongation and flakiness index test**: (2 Hours)**
v. Marshall Stability test**: (2 Hours)**
vi. Flash point test**: (2 Hours)**
vii. Fire Test**: (2 Hours)**
viii. Ductility test**: (2 Hours)**
ix. Penetration test for bitumen**: (1 Hour)**
x. Specific gravity and water absorption of Aggregate**: (1 Hour)**
xi. Viscosity test**: (1 Hours)**
xii. Aggregate crushing value**: (1 Hour)**

G. Examination Scheme:

Components	**IA**				**EE**	
	A	**PR**	**LR**	**V**	**PR**	**V**
Weightage (%)	**5**	**10**	**10**	**5**	**35**	**35**

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva

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H. Suggested Text/Reference Books:

- Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Revised 10th Edition, Nem Chand & Bros, 2017
- Kadiyalai, L.R., ' Traffic Engineering and Transport Planning', Khanna Publishers.
- Partha Chakraborty, ' Principles Of Transportation Engineering, PHI Learning

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Los Angles Abrasion Test:	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
2	Los Angles Abrasion Test:	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
3	Crushing test:	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
4	Crushing test:	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
5	Impact test for aggregates	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
6	Impact test for aggregates	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
7	*Elongation and flakiness index test:*	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
8	*Elongation and flakiness index test:*	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
9	Marshall Stability test	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
10	Marshall Stability test	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam

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11	Flash point test	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
12	Flash point test	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
13	Fire Test:	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
14	Fire Test:	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
15	Ductility test:	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
16	Ductility test:	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
17	Penetration test for bitumen	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
18	Penetration test for bitumen	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
19	Specific gravity and water absorption of Aggregate	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
20	Specific gravity and water absorption of Aggregate	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
21	Viscosity test:	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
22	Viscosity test:	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
23	Aggregate crushing value	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External Exam
24	Aggregate crushing value	Lecture	CIV527.1 & CIV527.2	Internal Assessment, Viva &External 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		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV527.1.	Understand the properties of materials used for construction of highways and airports.	3	**2**	1	2	1	-	**1**	-	2		2	1	**2**	**1**	**3**
CIV527.2.	*Understand the transportation characteristics, operations, design, planning, and maintenance.*	3	2	1	2	2	**1**	-	-	2		1	1	**3**	**1**	**1**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–V) 2023-24		
Class: B.Tech.(CE) V Semester		
Subject Name: CIV527 TRANSPORTATION ENGINEERING Lab	Time: 2 Hrs	Max.Marks:30

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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

CO1: Classify basic design of highway geometry according to the design specifications.

CO2: Design a flexible pavement using IRC method and Describe various components of railways and their functions.

CO Map	Question No.	Question	Marks
CO1	Q.1	Explain briefly main features of Indian Road Congress.	3
CO1	Q.2a	Write a short note on Carriageway width?	3
	Q.2b	How the excavation is done in highway construction?	3
CO1	Q.3	Explain briefly the calculation of length of the transition curve.	6
CO2	Q.4	Evaluate grain size analysis on highway materials.	3
CO2	Q.5a	What are the objectives of Highway Research Board?	3
	Q.5b	How the map study is done? Discuss.	3
CO2	Q6	While aligning a highway in a built up area, it was necessary to provide a horizontal circular curve of radius 446 m. The design speed is 85 Kmph, the length of wheel base is 8m and the pavement width is 12m. Design super elevation, extra widening and length of transition curve.	6

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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B.Tech (Civil Engineering)

2021-2025

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Exam Result For (Semester) : V

Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	CIV527 TRANSPORTATION ENGINEERING LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U13G13
1	A60215821003	Mr SHAD KHAN	100	30	70	A+	10	1	1	10
2	A60215821004	Mr SOHAM UPADHYAY	100	30	70	A+	10	1	1	10
			Total No. of Students			=	2			
			Total No. of Students			>60 % marks	2	100.00	%	
			Attainment Level					Level 3		

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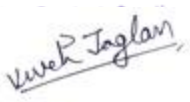

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : CONSTRUCTION ENGINEERING & MANAGEMENT
Course Code : CIV601, Crédits : 03, Session :2023-24 (Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia

A. Introduction: The objective of this course is to to train the students with the latest and the best in the rapidly changing fields of Construction Engineering, Technology and Management and to prepare the students to be industry leaders who implement the best engineering and management practices and technologies in the construction industry. It aims to continually work with industry to enhance the program's effectiveness and the opportunities for innovation in the construction industry and to conduct research to develop advanced technologies and management approaches.

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

CIV601.1.*Able to describe the requirement of planning and management.*

CIV601.2.*Able to recognize the critical path and pert suitability for research projects and able to determine projects schedule and estimate the activity time of CPM.*

CIV601.3.*Able to illustrate various construction equipments, machinery and their utility*

CIV601.4.*Able to discuss resource scheduling and planning of civil engineering. Projects*

CIV601.5.*Perform rate analysis as required in preparing specifications, detailed estimate and tender documents etc*

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

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PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. 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.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

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PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Construction Management and its features(6 Hours)

Basics of Construction- Unique features of construction, construction projects types and features, phases of a project, agencies involved and their methods of execution;

Module II: PERT and CPM (6 Hours)

Construction project planning- Stages of project planning: pre-tender planning, pre-construction planning, detailed construction planning, role of client and contractor, level of detail. Process of development of plans and schedules, work break-down structure, activity lists, assessment of work content, concept of productivities, estimating durations; Networks: basic terminology, types of precedence relationships, preparation of CPM networks: activity on link and activity on node representation, computation of float values, critical and semi critical paths, calendaring networks. PERT- Assumptions underlying PERT analysis, determining three time estimates, analysis, slack computations.

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Module III: Methods of Constructions (6 Hours)

Construction Methods basics: Types of foundations and construction methods; Basics of Formwork and Staging; Common building construction methods (conventional walls and slabs; conventional framed structure with blockwork walls; Modular construction methods for repetitive works; Precast concrete construction methods; Basics of Slip forming for tall structures; Basic construction methods for steel structures; Basics of construction methods for Bridges. Construction Equipment basics: Conventional construction methods Vs Mechanized methods and advantages of latter; Equipment for Earthmoving, Dewatering; Concrete mixing, transporting & placing; Cranes, Hoists and other equipment for lifting; Equipment for transportation of materials. Equipment Productivities.

Module IV: Construction Site and Resources (6 Hours)

Planning and organizing construction site and resources- Site: site layout including enabling structures, developing site organization, Documentation at site; Manpower: planning, organizing, staffing, motivation; Materials: concepts of planning, procurement and inventory control; Equipment: basic concepts of planning and organizing; Funds: cash flow, sources of funds; Histograms and S-Curves. Earned Value; Resource Scheduling- Bar chart, line of balance technique, resource constraints and conflicts; resource aggregation, allocation, smoothening and leveling. Common Good Practices in Construction

Module V: Contracts (6 Hours)

Contracts Management basics: Importance of contracts; Types of Contracts, parties to a contract; Common contract clauses (Notice to proceed, rights and duties of various parties, notices to be given, Contract Duration and Price. Performance parameters; Delays, penalties and liquidated damages; Force Majeure, Suspension and Termination. Changes & variations, Dispute Resolution methods. Construction Costs: Make-up of construction costs; Classification of costs, timecost trade-off in construction projects, compression and decompression.

G. 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

H. Suggested Text/Reference Books:

- Varghese, P.C., “Building Construction”, Prentice Hall India, 2007.
- National Building Code, Bureau of Indian Standards, New Delhi, 2017.

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- Chudley, R., Construction Technology, ELBS Publishers, 2007.
- Peurifoy, R.L. Construction Planning, Methods and Equipment, McGraw Hill, 2011
- Nunnally, S.W. Construction Methods and Management, Prentice Hall, 2006
- Jha, Kumar Neeraj., Construction Project management, Theory & Practice, Pearson Education India, 2015
- Punmia, B.C., Khandelwal, K.K., Project Planning with PERT and CPM, Laxmi Publications, 2016.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Basics of Construction	Lecture	CIV601.1	Mid Term-1, Quiz & End Sem Exam
2	Unique features of construction	Lecture	CIV601.1	Mid Term-1, Quiz & End Sem Exam
3	construction projects types and features	Lecture	CIV601.1	Mid Term-1, Quiz & End Sem Exam
4	*phases of a project, agencies involved and their methods of execution*	Lecture	CIV601.1	Mid Term-1, Quiz & End Sem Exam
5	Construction project planning- Stages of project planning: pre-tender planning, pre-construction planning, detailed construction planning	Lecture	CIV601.2	Mid Term-1, Quiz & End Sem Exam
6	role of client and contractor, level of detail. Process of development of plans and schedules	Lecture	CIV601.2	Mid Term-1, Quiz & End Sem Exam
7	work break-down structure, activity lists, assessment of work content	Lecture	CIV601.2	Mid Term-1, Quiz & End Sem Exam
8	concept of productivities, estimating durations; Networks: basic terminology	Lecture	CIV601.2	Mid Term-1, Quiz & End Sem Exam
9	types of precedence relationships, preparation of CPM networks: activity	Lecture	CIV601.2	Mid Term-1, Quiz & End Sem Exam

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	on link and activity on node representation			
10	computation of float values, critical and semi critical paths, calendaring networks.	Lecture	CIV601.2	Mid Term-1, Quiz & End Sem Exam
11	PERT- Assumptions underlying PERT analysis, determining three time estimates, analysis, slack computations	Lecture	CIV601.2	Mid Term-1, Quiz & End Sem Exam
12	Construction Methods basics: Types of foundations and construction methods	Lecture	CIV601.3	Mid Term-1, Quiz & End Sem Exam
13	Formwork and Staging; Common building construction methods (conventional walls and slabs; conventional framed structure with blockwork walls	Lecture	CIV601.3	Mid Term-1, Quiz & End Sem Exam
14	Modular construction methods for repetitive works; Precast concrete construction methods; Basics of Slip forming for tall structures	Lecture	CIV601.3	Mid Term-1, Quiz & End Sem Exam
15	Basic construction methods for steel structures; Basics of construction methods for Bridges	Lecture	CIV601.3	Mid Term-1, Quiz & End Sem Exam
16	Construction Equipment basics: Conventional construction methods Vs Mechanized methods and advantages of latter; Equipment for Earthmoving, Dewatering	Lecture	CIV601.3	Mid Term-1, Quiz & End Sem Exam
17	Concrete mixing, transporting & placing; Cranes, Hoists and other	Lecture	CIV601.3	Mid Term-1, Quiz & End Sem Exam

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	equipment for lifting			
18	Equipment for transportation of materials. Equipment Productivities.	Lecture	CIV601.3	Mid Term-1, Quiz & End Sem Exam
19	Planning and organizing construction site and resources- Site: site layout including enabling structures, developing site organization	Lecture	CIV601.4	Mid Term-1, Quiz & End Sem Exam
20	Documentation at site; Manpower: planning, organizing, staffing, motivation; Materials: concepts of planning, procurement and inventory control	Lecture	CIV601.4	Mid Term-1, Quiz & End Sem Exam
21	Equipment: basic concepts of planning and organizing	Lecture	CIV601.4	Assignment, Quiz & End Sem Exam
22	Funds: cash flow, sources of funds; Histograms and S-Curves. Earned Value; Resource Scheduling	Lecture	CIV601.4	Assignment, Quiz & End Sem Exam
23	Bar chart, line of balance technique, resource constraints and conflicts	Lecture	CIV601.4	Assignment, Quiz & End Sem Exam
24	resource aggregation, allocation, smoothening and leveling. Common Good Practices in Construction	Lecture	CIV601.4	Assignment, Quiz & End Sem Exam
25	Contracts Management basics: Importance of contracts	Lecture	CIV601.5	Assignment, Quiz & End Sem Exam
26	Types of Contracts, parties to a contract; Common contract clauses	Lecture	CIV601.5	Assignment, Quiz & End Sem Exam
27	Performance parameters; Delays, penalties and liquidated damages; Force Majeure,	Lecture	CIV601.5	Assignment, Quiz & End Sem Exam
28	Notice to proceed, rights	Lecture	CIV601.5	Assignment, Quiz

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	and duties of various parties, notices to be given, Contract Duration and Price			& End Sem Exam
29	Performance parameters; Delays, penalties and liquidated damages; Force Majeure,	Lecture	CIV601.5	Assignment, Quiz & End Sem Exam
30	Suspension and Termination. Changes & variations, Dispute Resolution methods	Lecture	CIV601.5	Assignment, Quiz & End Sem Exam
31	Construction Costs: Make-up of construction costs; Classification of costs	Lecture	CIV601.5	Assignment, Quiz & End Sem Exam
32	timecost trade-off in construction projects, compression and decompression	Lecture	CIV601.5	Assignment, Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV601.1.	Able to describe the requirement of planning and management.	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**

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CIV601.2.	Able to recognize the critical path and pert suitability for research projects and able to determine projects schedule and estimate the activity time of CPM.	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV601.3.	Able to illustrate various construction equipments, machinery and their utility	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
CIV601.4.	Able to discuss resource scheduling and planning of civil engineering. Projects	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
CIV601.5.	Perform rate analysis as required in preparing specifications, detailed estimate and tender documents etc	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–VI) 2023-24
Class: B.Tech.(CE) VI Semester

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Subject Name: CIV 601 CONSTRUCTION ENGINEERING & MANAGEMENT		Time: 2 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		

Student will be able to

CO1: Able to describe the requirement of planning and management.

CO2: *Able to recognize the critical path and pert suitability for research projects and able to determine projects schedule and estimate the activity time of CPM.*

CO Map	Question No.	Question	Marks
CO1	Q.1	Explain the necessity of labour legislation. Explain any two labour laws.	3
CO1	Q.2a	Define management. Explain functions and principles of management.	3
	Q.2b	Classify the equipments required in construction industry.	3
CO1	Q.3	Discuss objectives of construction management and Explain Planning, Scheduling and Controlling as a Function of Construction Management.	6
CO2	Q.4	State Rules for drawing network. Explain with suitable examples, errors in AOA networks	3
CO2	Q.5a	Explain the concept of time value of money.	3
	Q.5b	Explain, Why time cost trade off is necessary? Discuss various ways to reduce the activity duration.	3
CO2	Q6	A small project consists of twelve activities. Interrelationships amongst various activities are as follows: • Activity A is starting activity and proceeds activities B,C and D. • Activity E depends on activities B and C • Activity F follows activities C and D. • Activities G and H can start as soon as activity D is completed. • Activity I succeeds activities G, E and F. • Activities J and K can start only when activities H and I are completed. • Activity L is the last activity and it succeeds activities J and K. • Prepare dependency table and draw AOA diagram.	6

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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

Amity University Madhya Pradesh
B.Tech (Civil Engineering)
2021-2025
Exam Result For (Semester) : VI
Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	CIV601 CONSTRUCTION ENGINEERING & MANAGEMENT							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U2G2
1	A60215821003	Mr SHAD KHAN	100	30	70	B	6	3	3	18
2	A60215821004	Mr SOHAM UPADHYAY	100	30	70	B-	5	3	3	15
			Total No. of Students			=	2			
			Total No. of Students			>60 % marks	0	0.00	%	
			Attainment Level					-		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : GEOMETRIC DESIGN OF HIGHWAYS
Course Code : CIV602, Crédits : 03, Session :2023-24 (Even Sem.), Class : B.Tech. 3rd Year
Faculty Name :, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi

A. Introduction: The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis, and lin,ear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

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

CIV602.1. *Gain knowledge about highways, and able to design the roads & bridges by geometric method*

CIV602.2. *Know the different types of points and crossings used in railway track and Knowledge of signalling systems in railway stations and yards.*

CIV602.3. *design and orient airport runways and apply various visual aids in the designing of airport*

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

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PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. 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.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %

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Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Introduction: Classification of rural highways and urban roads. Objectives and requirements of highway geometric design; Design Controls: Topography, vehicle characteristics and design vehicle, driver characteristics, speed, traffic flow and capacity, levels of service, pedestrian and other facilities, environmental factors; Design Elements: Sight distances**: (5 Hours)**

Module II: Horizontal alignment - design considerations, stability at curves, super elevation, widening, transition curves; curvature at intersections, vertical alignment - grades, ramps, design of summit and valley curves, combination of vertical and horizontal alignment including design of hair pin bends, design of expressways**: (5 Hours)**

Module III: IRC standards and guidelines for design problems; Cross Section Elements: Right of way and width considerations, roadway, shoulders, kerbs traffic barriers, medians, frontage roads; Facilities for pedestrians, bicycles, buses and trucks, Pavement surface characteristics - types, cross slope, skid resistance, unevenness; Design Considerations: Design considerations for rural and urban arterials, freeways, and other rural and urban roads; Design Of Intersections: Characteristics and design considerations of at-grade intersections;; Rotary intersections; Grade separations and interchanges -; Design of Parking lots**: (10 Hours)**

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Module IV: Aircraft characteristics; Aircraft performance characteristics: Airport planning and air travel demand forecasting: Airport Site Selection; Geometric Design of the Airfield: Determination of Runway Capacity and Delay - Taxiway and Gate Capacity - Holding Aprons - Terminal Aprons – Airport drainage - Function of Airport Passenger and Cargo Terminal - Design of Air Freight Terminals - Airport access - Airport Landside planning - Capacity**: (10 Hours)**

G. 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

H. Suggested Text/Reference Books:

- Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Revised 10th Edition, Nem Chand & Bros, 2017
- Kadiyalai, L.R., ' Traffic Engineering and Transport Planning', Khanna Publishers.
- Partha Chakraborty, ' Principles Of Transportation Engineering, PHI Learning, Tomlinson
- Fred L. Mannering, Scott S. Washburn, Walter P. Kilareski,'Principles of Highway Engineering and Traffic Analysis', 4th Edition, John Wiley
- Srinivasa Kumar, R, Textbook of Highway Engineering, Universities Press, 2011.
- Paul H. Wright and Karen K. Dixon, Highway Engineering, 7th Edition, Wiley Student Edition, 2009.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Classification of rural highways and urban roads	Lecture	CIV602.1	Mid Term-1, Quiz & End Sem Exam
2	Objectives and requirements of highway geometric design; Design Controls	Lecture	CIV602.1	Mid Term-1, Quiz & End Sem Exam

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3	Topography, vehicle characteristics and design vehicle, driver characteristics, speed	Lecture	CIV602.1	Mid Term-1, Quiz & End Sem Exam
4	*traffic flow and capacity, levels of service, pedestrian and other facilities*	Lecture	CIV602.1	Mid Term-1, Quiz & End Sem Exam
5	Design Elements: Sight distances	Lecture	CIV602.1	Mid Term-1, Quiz & End Sem Exam
6	Horizontal alignment - design considerations, stability at curves, super elevation	Lecture	CIV602.1	Mid Term-1, Quiz & End Sem Exam
7	widening, transition curves; curvature at intersections, vertical alignment	Lecture	CIV602.1	Mid Term-1, Quiz & End Sem Exam
8	grades, ramps, design of summit and valley curves, combination of vertical and horizontal alignment including design of hair pin bends, design of expressways	Lecture	CIV602.1	Mid Term-1, Quiz & End Sem Exam
9	IRC standards and guidelines for design problems; Cross Section Elements	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
10	Right of way and width considerations, roadway, shoulders, kerbs traffic barriers, medians, frontage roads	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
11	Facilities for pedestrians, bicycles, buses and trucks,	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
12	types, cross slope,	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
13	Design Considerations: Design considerations for rural and urban arterials	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
14	Pavement surface characteristics	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
15	skid resistance, unevenness	Lecture	CIV602.2	Mid Term-1, Quiz

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				& End Sem Exam
16	freeways, and other rural and urban roads	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
17	Design Of Intersections: Characteristics	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
18	design considerations of at-grade intersections	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
19	Rotary intersections;	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
20	Grade separations and interchanges	Lecture	CIV602.2	Mid Term-1, Quiz & End Sem Exam
21	Design of Parking lots	Lecture	CIV602.2	Assignment, Quiz & End Sem Exam
22	Aircraft characteristics	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
23	Aircraft performance characteristics	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
24	Airport planning	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
25	Airport Site Selection	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
26	Geometric Design of the Airfield	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
27	Determination of Runway Capacity and Delay	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
28	Taxiway and Gate Capacity	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
29	Holding Aprons	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
30	Terminal Aprons	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
31	Airport drainage	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
32	Function of Airport Passenger and Cargo Terminal	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
33	Design of Air Freight Terminals	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
34	Airport access	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam
35	Airport Landside planning - Capacity	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam

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36	air travel demand forecasting	Lecture	CIV602.3	Assignment, Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV602.1.	**Gain knowledge about highways, and able to design the roads & bridges by geometric method**	3	**2**	1	**1**	1	**2**	**-**	**-**	2	**1**	2	1	**3**	**2**	**3**
CIV602.2.	**Know the different types of points and crossings used in railway track and Knowledge of signalling systems in railway stations and yards.**	3	2		2	2				2		1	1	**2**	**3**	**2**
CIV602.3.	**design and orient airport runways and apply various**	3	2		2	2				3		3	1	**3**	**1**	**3**

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	visual aids in the designing of airport														

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–VI) 2023-24						
Class: B.Tech.(CE) VI Semester						
Subject Name: CIV 602 GEOMETRIC DESIGN OF HIGHWAYS		Time: 2 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		
Student will be able to *CO1: Gain knowledge about highways, and able to design the roads & bridges by geometric method* CO2: *Know the different types of points and crossings used in railway track and Knowledge of signalling systems in railway stations and yards.*						

CO Map	Question No.	Question	Marks
CO1	Q.1	What do you understand by non-passing sight distance?	3
CO1	Q.2a	Write down the requirements of an ideal transition curve.	3
	Q.2b	What is mean by minimum gradient in highway? Why it is provided?	3
CO1	Q.3	What is the factor governing super elevation of a road surface? What is mean by super elevation?	6
CO2	Q.4	Define stopping sight distance.	3

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CO2	Q.5a	State PIEV theory	3
	Q.5b	What is transition curve?	3
CO2	Q6	Briefly explain illumination sight distance.	6

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

Amity University Madhya Pradesh
B.Tech (Civil Engineering)
2021-2025
Exam Result For (Semester) : VI
Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	CIV602 GEOMETRIC DESIGN OF HIGHWAYS							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U3G3
1	A60215821003	Mr SHAD KHAN	100	30	70	A	9	3	3	27
2	A60215821004	Mr SOHAM UPADHYAY	100	30	70	A+	10	3	3	30
			Total No. of Students			=	2			
			Total No. of Students			>60 % marks	2	100.00	%	
			Attainment Level					Level 3		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : ENVIRONMENTAL ENGINEERING – II
Course Code : CIV603, Crédits : 03, Session :2023-24 (Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia

A. Introduction: The objective of the course is to make students gain insight into how the water and wastewater gets transported through conduits and open channels, and use the same for the design, operation and maintenance of these systems, to provide an in depth understanding of physical and physico-chemical processes used for water and wastewater treatment systems and to provide capability to design such systems..

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

CIV603.1. Know about sewerage system and its drainage.

CIV603.2.Implement technology related with purification of waste water according to IS parameters and low cost sanitation systems.

CIV603.3. Understand various fundamental scientific processes underlying the design and operation of waste water treatment plants.

CIV603.4 Understand chemical and biological principles behind unit processes used in waste water treatment unit processes.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

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PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. 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.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

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PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Water Quality Engineering. Fundamental theory underlying the unit processes utilized in the treatment of water for domestic and industrial usage, and in the treatment of domestic and industrial wastewaters**: (5 Hours)**

Module II: Transport of wastewater: Sanitary Sewerage Systems: Flow estimation, sewer materials, hydraulics of flow in sewers, sewer lay out, sewer transitions, materials for sewers, appurtenances, manholes, sewer design, conventional and model based design, sewage pumps and pumping stations, corrosion prevention, operation and maintenance, safety. Storm water Drainage Systems: Drainage layouts, storm runoff estimation, hydraulics of flow in storm water drains, materials, cross sections, design of storm water drainage systems, inlets, storm water pumping, operation and maintenance**: (10 Hours)**

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Module III: Physico-Chemical Processes for wastewater treatment.

Water purification in natural systems, physical processes, chemical processes and biological processes. Primary, secondary and tertiary treatment. Unit operations, unit processes. Aeration and gas transfer. Sedimentation, different types of settling, sedimentation tank design. Coagulation and flocculation, coagulation processes, stability of colloids, destabilization of colloids, destabilization in water and wastewater treatment, transport of colloidal particles, design aspects**: (5 Hours)**

Module IV: Biological processes for contaminant removal

Characterization of waste. Aerobic, anaerobic and anoxic systems. Suspended and attached growth biological systems. Activated Sludge processand process modifications, Process design considerations, Treatment Ponds and aerated Lagoons, aerobic pond, facultative pond, anaerobic ponds, polishing ponds, constructed wet lands etc. Attached Growth Biological Treatment Systems, Trickling Filters, Rotating Biological Contactors, Activated Biofilters, Moving bed biological reactor (MBBR), Sequential Batch reactors (SBR), Membrane Biological Reactors (MBR) etc. Anaerobic processes, Process fundamentals, Standard, high rate and hybrid reactors, Anaerobic filters, Expanded /fluidized bed reactors, Upflow anaerobic sludge blanket reactors, Performance and design aspects, Expanded granular bed reactors, Two stage/phase anaerobic reactors. Sludge Digestion, anaerobic digestion, aerobic digestion**: (10 Hours)**

G. 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

H. Suggested Text/Reference Books:

- Introduction to Environmental Engineering and Science by Gilbert Masters, Prentice Hall, New Jersey.
- Introduction to Environmental Engineering by P. Aarne Vesilind, Susan M. Morgan, Thompson /Brooks/Cole; Second Edition 2008.
- Peavy, H.s, Rowe, D.R, Tchobanoglous, G. *Environmental Engineering*, Mc-Graw - Hill International Editions, New York 1985.

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- MetCalf and Eddy. Wastewater Engineering, Treatment, Disposal and Reuse, Tata McGraw-Hill, New Delhi.
- Manual on Water Supply and Treatment. Ministry of Urban Development, New Delhi.
- Plumbing Engineering. Theory, Design and Practice, S.M. Patil, 1999
- Integrated Solid Waste Management, Tchobanoglous, Theissen & Vigil. McGraw Hill Publication
- Manual on Sewerage and Sewage Treatment Systems, Part A, B and C. Central Public Health and Environmental Engineering Organization, Ministry of Urban Development.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Fundamental theory underlying the unit processes utilized in the treatment of water for domestic usage	Lecture	CIV603.1	Mid Term-1, Quiz & End Sem Exam
2	Fundamental theory underlying the unit processes utilized in the treatment of water for industrial usage	Lecture	CIV603.1	Mid Term-1, Quiz & End Sem Exam
3	treatment of domestic and industrial wastewaters	Lecture	CIV603.1	Mid Term-1, Quiz & End Sem Exam
4	*treatment of domestic and industrial wastewaters*	Lecture	CIV603.1	Mid Term-1, Quiz & End Sem Exam
5	Sanitary Sewerage Systems	Lecture	CIV603.2	Mid Term-1, Quiz & End Sem Exam
6	Flow estimation, sewer materials	Lecture	CIV603.2	Mid Term-1, Quiz & End Sem Exam
7	hydraulics of flow in sewers, sewer lay out	Lecture	CIV603.2	Mid Term-1, Quiz & End Sem Exam
8	sewer transitions, materials for sewers	Lecture	CIV603.2	Mid Term-1, Quiz & End Sem Exam
9	appurtenances, manholes	Lecture	CIV603.2	Mid Term-1, Quiz & End Sem Exam
10	sewer design, conventional	Lecture	CIV603.2	Mid Term-1, Quiz

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	and model based design			& End Sem Exam
11	sewage pumps and pumping stations	Lecture	CIV603.2	Mid Term-1, Quiz & End Sem Exam
12	corrosion prevention, operation and maintenance	Lecture	CIV603.2	Mid Term-1, Quiz & End Sem Exam
13	Storm water Drainage Systems: Drainage layouts, storm runoff estimation	Lecture	CIV603.2	Mid Term-1, Quiz & End Sem Exam
14	hydraulics of flow in storm water drains, materials, cross sections	Lecture	CIV603.2	Mid Term-1, Quiz & End Sem Exam
15	design of storm water drainage systems, inlets, storm water pumping, operation and maintenance	Lecture	CIV603.3	Mid Term-1, Quiz & End Sem Exam
16	Water purification in natural systems	Lecture	CIV603.3	Mid Term-1, Quiz & End Sem Exam
17	physical processes, chemical processes and biological processes	Lecture	CIV603.3	Mid Term-1, Quiz & End Sem Exam
18	Primary, secondary and tertiary treatment	Lecture	CIV603.3	Mid Term-1, Quiz & End Sem Exam
19	Unit operations, unit processes. Aeration and gas transfer	Lecture	CIV603.3	Mid Term-1, Quiz & End Sem Exam
20	Sedimentation, different types of settling, sedimentation tank design	Lecture	CIV603.3	Mid Term-1, Quiz & End Sem Exam
21	Coagulation and flocculation, coagulation processes	Lecture	CIV603.3	Assignment, Quiz & End Sem Exam
22	stability of colloids, destabilization of colloids,	Lecture	CIV603.3	Assignment, Quiz & End Sem Exam
23	destabilization in water and wastewater treatment	Lecture	CIV603.3	Assignment, Quiz & End Sem Exam
24	transport of colloidal particles, design aspects:	Lecture	CIV603.3	Assignment, Quiz & End Sem Exam
25	Characterization of waste. Aerobic, anaerobic and anoxic systems	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam

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26	Suspended and attached growth biological systems. Activated Sludge processand process modifications, Process design considerations	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
27	Treatment Ponds and aerated Lagoons, aerobic pond	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
28	facultative pond, anaerobic ponds, polishing ponds	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
29	constructed wet lands etc. Attached Growth Biological Treatment Systems	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
30	Trickling Filters	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
31	Rotating Biological Contactors	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
32	Activated Biofilters, Moving bed biological reactor (MBBR)	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
33	quential Batch reactors (SBR), Membrane Biological Reactors (MBR)	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
34	Anaerobic processes, Process fundamentals, Standard, high rate and hybrid reactors, Anaerobic filters, Expanded /fluidized bed reactors	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
35	Upflow anaerobic sludge blanket reactors, Performance and design aspects, Expanded granular bed reactors	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam
36	Two stage/phase anaerobic reactors. Sludge Digestion, anaerobic digestion, aerobic digestion	Lecture	CIV603.4	Assignment, Quiz & End Sem Exam

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

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CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV603.1.	Know about sewerage system and its drainage.	3	3	2	3	2	-	**2**	**1**	1	-	2	3	3	3	2
CIV603.2.	Implement technology related with purification of waste water according to IS parameters and low cost sanitation systems.	3	1	2	3	2	-	**2**	**1**	1	-	3	3	1	3	2
CIV603.3.	Understand various fundamental scientific processes underlying the design and operation of waste water treatment plants.	3	2	2	3	2	-	**2**	**1**	1	-	3	3	1	2	2
CIV603.4.	Understand chemical and biological principles behind unit processes used in waste water treatment unit processes.	3	2	2	**1**	2	-	**2**	**3**	3	-	2	3	3	1	2

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Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–VI) 2023-24						
Class: B.Tech.(CE) VI Semester						
Subject Name: CIV 603 ENVIRONMENTAL ENGINEERING – II		Time: 2 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		

Student will be able to

CO1: Know about sewerage system and its drainage.

CO2: Implement technology related with purification of waste water according to IS parameters and low cost sanitation systems.

CO Map	Question No.	Question	Marks
CO1	Q.1	How will you estimate storm water flow? Explain it	3
CO1	Q.2a	Enlist different methods used for population forecast. Explain Any one in detail	3
	Q.2b	Classify the legal requirements and standards regarding treatment of sewage.	3
CO1	Q.3	Enlist the different types of pipes used for water supply. And explain cast iron Pipe in detail State the requirement of good disinfectant	6
CO2	Q.4	What is optimum dose of coagulant? How it is determined?	3
CO2	Q.5a	Define the following terms: (1) prechlorination (2) post chlorination (3) super chlorination (4) double chlorination (5) de chlorination	3
	Q.5b	Discuss the Environmental Legislation requirements while planning sewerage system	3
CO2	Q6	Write a short note on rapid sand filter	6

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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

Amity University Madhya Pradesh
B.Tech (Civil Engineering)
2021-2025
Exam Result For (Semester) : VI
Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	CIV603 ENVIRONMENTAL ENGINEERING – II							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U4G4
1	A60215821003	Mr SHAD KHAN	100	30	70	B	6	3	3	18
2	A60215821004	Mr SOHAM UPADHYAY	100	30	70	B-	5	3	3	15
			Total No. of Students			=	2			
			Total No. of Students			>60 % marks	0	0.00	%	
			Attainment Level					-		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : ESTIMATING AND COSTING
Course Code : CIV604, Crédits : 02 Session :2023-24 (Even Sem.), Class : B.Tech. 3rd Year
Faculty Name \ Dr. Ripunjoy Gogoi, Dr. P. Mahakavi

A. ***Introduction:*** This main objective is to develop in the student the art and skill whereby a monetary value can be placed on the volume of work previously measured. To develop an awareness of those factors that affect the cost of construction work and to analyze the influences that effect change in these factors. To encourage the habit of systematically recording all those statistics which are the stock in trade of the good estimator.

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

CIV604.1. Have an idea of Economics in general, Economics of India particularly for public sector agencies and private sector businesses

CIV604.2. Perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives.

CIV604.3. Quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure.

CIV604.4.*U*nderstand how competitive bidding works and how to submit a competitive bid proposal.

C. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

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PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. 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.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

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PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: (5 Hours)

Basic Principles and Methodology of Economics. Demand/Supply – elasticity – Government Policies and Application. Theory of the Firm and Market Structure. Basic Macro-economic Concepts (including GDP/GNP/NI/Disposable Income) and Identities for both closed and open economies. Aggregate demand and Supply (IS/LM). Price Indices (WPI/CPI), Interest rates, Direct and Indirect Taxes

Module II: (5 Hours)

Public Sector Economics –Welfare, Externalities, Labour Market. Components of Monetary and Financial System, Central Bank –Monetary Aggregates; Commercial Banks & their functions; Capital and Debt Markets. Monetary and Fiscal Policy Tools & their impact on the economy – Inflation and Phillips Curve. Indian economy - Brief overview of post-independence period – plans. Post reform Growth, Structure of productive

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activity. Issues of Inclusion – Sectors, States/Regions, Groups of people (M/F), Urbanization. Employment–Informal, Organized, Unorganized, Public, Private. Challenges and Policy Debates in Monetary, Fiscal, Social, External sectors.

Module III: (10 Hours)

Estimation / Measurements for various items- Introduction to the process of Estimation; Use of relevant Indian Standard Specifications for the same, taking out quantities from the given requirements of the work, comparison of different alternatives, Bar bending schedules, Mass haul Diagrams, Estimating Earthwork and Foundations, Estimating Concrete and Masonry, Finishes, Interiors, MEP works; BIM and quantity take-offs; adding equipment costs; labour costs; rate analysis;

Module IV: (10 Hours)

Specifications-Types, requirements and importance, detailed specifications for buildings, roads, minor bridges and industrial structures. Rate analysis-Purpose, importance and necessity of the same, factors affecting, task work, daily output from different equipment/ productivity. Tender- Preparation of tender documents, importance of inviting tenders, contract types, relative merits, prequalification. general and special conditions, termination of contracts, extra work and Changes, penalty and liquidated charges, Settlement of disputes, R.A. Bill & Final Bill, Payment of advance, insurance, claims, price variation, etc. Preparing Bids- Bid Price buildup: Material, Labour, Equipment costs, Risks, Direct & Indirect Overheads, Profits; Bid conditions, alternative specifications; Alternative Bids. Bid process Management Introduction to Acts pertaining to-Minimum wages, Workman's compensation, Contracts, Arbitration, Easement rights.

G. 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

H. Suggested Text/Reference Books:

- Mankiw Gregory N. (2002), *Principles of Economics,* Thompson Asia
- V. Mote, S. Paul, G. Gupta(2004), *Managerial Economics,* Tata McGraw Hill
- Misra, S.K. and Puri (2009), *Indian Economy,* Himalaya

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- Pareek Saroj (2003), *Textbook of Business Economics,* Sunrise Publishers
- M Chakravarty, Estimating, Costing Specifications & Valuation
- Joy P K, Handbook of Construction Management, Macmillan
- B.S. Patil, Building & Engineering Contracts
- Relevant Indian Standard Specifications.
- World Bank Approved Contract Documents.
- FIDIC Contract Conditions.
- Acts Related to Minimum Wages, Workmen's Compensation, Contract, and Arbitration
- Typical PWD Rate Analysis documents.
- UBS Publishers & Distributors, Estimating and Costing in Civil Engineering: Theory and Practice including Specification and Valuations,2016
- Dutta, B.N., Estimating and Costing in Civil Engineering (Theory & Practice), UBS Publishers, 2016

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Basic Principles and Methodology of Economics	Lecture	CIV604.1	Mid Term-1, Quiz & End Sem Exam
2	Demand/Supply – elasticity – Government Policies and Application	Lecture	CIV604.1	Mid Term-1, Quiz & End Sem Exam
3	Basic Macro-economic Concepts (including GDP/GNP/NI/Disposable Income)	Lecture	CIV604.1	Mid Term-1, Quiz & End Sem Exam
4	*Identities for both closed and open economies. Aggregate demand and Supply (IS/LM)*	Lecture	CIV604.1	Mid Term-1, Quiz & End Sem Exam
5	Price Indices (WPI/CPI), Interest rates, Direct and Indirect Taxes	Lecture	CIV604.1	Mid Term-1, Quiz & End Sem Exam
6	Public Sector Economics – Welfare, Externalities, Labour Market. Components of Monetary and Financial System,	Lecture	CIV604.2	Mid Term-1, Quiz & End Sem Exam
7	Central Bank –Monetary Aggregates; Commercial	Lecture	CIV604.2	Mid Term-1, Quiz & End Sem Exam

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	Banks & their functions; Capital and Debt Markets. Monetary and Fiscal Policy Tools & their impact on the economy			
8	Inflation and Phillips Curve. Indian economy	Lecture	CIV604.2	Mid Term-1, Quiz & End Sem Exam
9	- Brief overview of post-independence period	Lecture	CIV604.2	Mid Term-1, Quiz & End Sem Exam
10	plans. Post reform Growth, Structure of productive activity. Issues of Inclusion	Lecture	CIV604.2	Mid Term-1, Quiz & End Sem Exam
11	Sectors, States/Regions, Groups of people (M/F), Urbanization. Employment	Lecture	CIV604.2	Mid Term-1, Quiz & End Sem Exam
12	Informal, Organized, Unorganized, Public, Private	Lecture	CIV604.2	Mid Term-1, Quiz & End Sem Exam
13	Challenges and Policy Debates in Monetary, Fiscal, Social, External sectors	Lecture	CIV604.2	Mid Term-1, Quiz & End Sem Exam
14	Estimation / Measurements for various items- Introduction to the process of Estimation	Lecture	CIV604.3	Mid Term-1, Quiz & End Sem Exam
15	Use of relevant Indian Standard Specifications for the same, taking out quantities from the given requirements of the work	Lecture	CIV604.3	Mid Term-1, Quiz & End Sem Exam
16	comparison of different alternatives, Bar bending schedules, Mass haul Diagrams	Lecture	CIV604.3	Mid Term-1, Quiz & End Sem Exam
17	Estimating Earthwork and Foundations	Lecture	CIV604.3	Mid Term-1, Quiz & End Sem Exam
18	Estimating Concrete and Masonry, Finishes, Interiors	Lecture	CIV604.3	Mid Term-1, Quiz & End Sem Exam
19	MEP works; BIM and quantity take-offs	Lecture	CIV604.3	Mid Term-1, Quiz & End Sem Exam
20	adding equipment costs;	Lecture	CIV604.3	Mid Term-1, Quiz

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	labour costs; rate analysis			& End Sem Exam
21	Specifications-Types, requirements and importance, detailed specifications for buildings, roads, minor bridges and industrial structures. Rate analysis-Purpose, importance and necessity of the same, factors affecting, task work, daily output from different equipment/ productivity	Lecture	CIV604.4	Assignment, Quiz & End Sem Exam
22	Tender- Preparation of tender documents, importance of inviting tenders, contract types, relative merits, prequalification. general and special conditions	Lecture	CIV604.4	Assignment, Quiz & End Sem Exam
23	termination of contracts, extra work and Changes, penalty and liquidated charges, Settlement of disputes, R.A. Bill & Final Bill, Payment of advance, insurance, claims, price variation, etc. Preparing Bids- Bid Price buildup: Material, Labour, Equipment costs, Risks, Direct & Indirect Overheads	Lecture	CIV604.4	Assignment, Quiz & End Sem Exam
24	Profits; Bid conditions, alternative specifications; Alternative Bids. Bid process Management Introduction to Acts pertaining to-Minimum wages, Workman's compensation, Contracts, Arbitration, Easement rights.	Lecture	CIV604.4	Assignment, 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		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV604.1.	Have an idea of Economics in general, Economics of India particularly for public sector agencies and private sector businesses	3	2	1	3	1	**2**		**3**	2	**3**	2	3	**1**	**2**	**3**
CIV604.2.	Be able to perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives.	3	2	3	-	2	**2**	**-**	**3**	2	**3**	2	3	**3**	**1**	**1**
CIV604.3.	Quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure.	3	2	1	2	-	**2**	**2**	**3**	-	**-**	2	3	**3**	**2**	**3**

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CIV604.4.	*Understand how competitive bidding works and how to submit a competitive bid proposal*	3	2	1	3	1	**2**	-	**3**	2	**3**	2	3	**1**	**2**	**3**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–VI) 2023-24						
Class: B.Tech.(CE) VI Semester						
Subject Name: CIV 604 ESTIMATING AND COSTING		Time: 2 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		

Student will be able to

CO1: Have an idea of Economics in general, Economics of India particularly for public sector agencies and private sector businesses

CO2: Perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives.

CO Map	Question No.	Question	Marks
CO1	Q.1	List the types of estimate.	3
CO1	Q.2a	What is a detailed estimate?	3
	Q.2b	What are the different types of Approximate Estimate?	3
CO1	Q.3	Identify the recommendations for degree of accuracy on measurements. Determine the methods to be adopted to calculate	6

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		volume.	
CO2	Q.4	Generalize the duties of quantity surveyor.	3
CO2	Q.5a	State the unit of measurements for earth work, D.P.C and brick	3
	Q.5b	Identify various types of paneled and glazed doors.	3
CO2	Q6	Mention the units of measurement for Steel reinforcement, plastering, flooring and painting.	6

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

Amity University Madhya Pradesh

B.Tech (Civil Engineering)

2021-2025

Exam Result For (Semester) : VI

Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	**CIV604** ESTIMATING AND COSTING							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U5G5
1	A60215821003	Mr SHAD KHAN	100	30	70	A	9	2	2	18
2	A60215821004	Mr SOHAM UPADHYAY	100	30	70	A+	10	2	2	20
			Total No. of Students			=	2			
			Total No. of Students			>60 % marks	2	100.00	%	
			Attainment Level					Level 3		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : OPEN CHANNEL FLOW LAB
Course Code : CIV626, Crédits : 01, Session :2023-24 (Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Vimal Kumar Gupta, Mr. Sachin Tiwari

A. Introduction: The main objective is to *to introduce the students to various hydraulic engineering problems like open channel flows and hydraulic machines. At the completion of the course, the student should be able to relate the theory and practice of problems in hydraulic engineering*.

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

CIV624.1. Understand knowledge of fluid mechanics in addressing problems in open channels.

CIV624.2. solve problems in uniform, gradually and rapidly varied flow in steady state conditions.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

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PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. 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.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

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E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

a. Deriving an approximate estimate for a multistoried building by approximate methods.(3 hours)
b. Detailed estimate for the following with the required material survey for the same. (5 hours)
    1. Ground plus three storied RCC Framed structure building with blockwork walls
    2. bridge with minimum 2 spans
    3. factory building
    4. road work
    5. cross drainage work
    6. Ground plus three storied building with load-bearing walls
    7. Cost of finishes, MEP works for (f) above
c. Preparation of valuation report in standard Government form. (3 hours)
d. Assignments on rate analysis, specifications and simple estimates. (3 hours)
e. Detailed estimate of minor structure. (3 hours)
f. Preparation of Bar bending schedule. (3 hours)

G. Examination Scheme:

IA	EE

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A	PR	Practical Based Test	Major Experiment	Minor Experiment	LR	Viva
5	10	15	35	15	10	10

Note: IA –InternalAssessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Text/Reference Books:

- Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard Book House
- Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
- Open channel Flow, K. Subramanya, Tata McGraw Hill.
- Open Channel Hydraulics, Ven Te Chow, Tata McGraw Hill.
- Burnside, C.D., "Electromagnetic Distance Measurement," Beekman Publishers, 1971.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Flow Visualization	Lecture	CIV626.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
2	Uniform Flow	Lecture	CIV626.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
3	Velocity Distribution in Open channel flow	Lecture	CIV626.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
4	Venturi Flume	Lecture	CIV626.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
5	Standing Wave Flume	Lecture	CIV626.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
6	Gradually Varied Flow	Lecture	CIV626.1	Internal

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				Assessment, Lab Record, Quiz and End Sem Exam
7	Hydraulic Jump	Lecture	CIV626.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
8	Flow through pipes	Lecture	CIV626.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
9	Turbulent flow through pipes	Lecture	CIV626.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
10	Laminar flow through pipes	Lecture	CIV626.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
11	Assignments on rate analysis, specifications and simple estimates	Lecture	CIV626.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
12	Detailed estimate of minor structure	Lecture	CIV626.2	Internal Assessment, Lab Record, Quiz and End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

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CIV626.1.	Understand knowledge of fluid mechanics in addressing problems in open channels.	3	3	1	3	1	**2**	**3**		2	-	2	3	**3**	**2**	**1**
CIV626.2.	solve problems in uniform, gradually and rapidly varied flow in steady state conditions.	3	2	2	3	1	**2**	**3**		2	**2**	2	3	**3**	**2**	**3**

Amity University Madhya Pradesh
B.Tech (Civil Engineering)
2021-2025
Exam Result For (Semester) : VI
Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	CIV606 OPEN CHANNEL FLOW							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U6G6
1	A60215821003	Mr SHAD KHAN	100	30	70	A	9	3	3	27
2	A60215821004	Mr SOHAM UPADHYAY	100	30	70	A	9	3	3	27
			Total No. of Students			=	2			
			Total No. of Students			>60 % marks	2	100.00	%	
			Attainment Level					Level 3		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : GEOMETRIC DESIGN OF HIGHWAYS LAB
Course Code : CIV622, Crédits : 01, Session :2023-24 (Even Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Ripunjoy Gogoi, Dr. P. Mahakavi

A. *Introduction:* *The objective of this course is to learn and practice* of computer-aided design (CAD) software in the context of highway alignments. The roadway-design software used is that favored by the Texas Department of Transportation (TxDOT) & many others is GEOPAK. This software runs through MicroStation (a common CAD package).

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

CIV622.1. *U*se the features of MicroStation, GEOPAK, and engineering judgment to design one side of a grade-separated, Two-Quadrant, Partial Cloverleaf A Interchange as depicted in AASHTO 2004.

CIV622.2. Learn to work on a team and make effective project presentations and recognize the value of interactions with other professional disciplines.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

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PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

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PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

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PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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PO12. 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.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

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PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

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E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

- **List of experiments/demonstrations:**
- **Lab 1:** Introduction to MicroStation - Learn the basics of MicroStation required to operate GEOPAK. **(1 Hour)**
- **Lab 2:** Leg Centerline and Lanes using MicroStation - Learn the basics of MicroStation required to operate GEOPAK by drawing a simple leg centerline and lanes. **(1 Hour)**
- **Lab 3:** Areas & Dimensioning using MicroStation - Learn the concepts of points, lines, direction, distance, traverse, bearing and distance, Northing and Easting, dimensioning, and area measurement. **(1 Hour)**
- **Lab 4:** Pavement Edge Design using a Simple Arc with & without a Taper using MicroStation - Learn pavement edge design & vehicle off-tracking concepts using IGIDS-created vehicle turn template. Observe the reduction in circular arc radius and area when a taper section is added. **(1 Hour)**
- **Lab 5:** Horizontal Circular Curve using GEOPAK - Learn how to place a horizontal circular curve using GEOPAK. **(1 Hour)**
- **Lab 6:** Performing Lab 2 (Leg Centerline & Lanes) using GEOPAK - Learn horizontal alignment design using GEOPAK. **(1 Hour)**
- **Lab 7:** Define Superelevation Runoff using GEOPAK - Learn superelevation runoff

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design using GEOPAK. **(1 Hour)**

- **Lab 8:** Define a Spiral Curve using GEOPAK - Learn spiral curve design using GEOPAK. **(2 Hour)**
- **Lab 9:** Define a Vertical Profile using GEOPAK - Learn vertical alignment design using GEOPAK **(2 Hour)**.
- **Lab 10**: Design Project Part 1 - Define the Vertical Alignment for Road 2000 over the Freeway using GEOPAK**(2 Hour)**
- **Lab 11:** Design Project Part 2 - Design the Intersection Channelization of the Grade-Separated, Two-Quadrant, Partial Cloverleaf A Interchange using MicroStatio. **(2 Hour)**
- **Lab 12:** Design Project Part 3 - Design the Freeway Entrance Ramp of the Grade-Separated, Two-Quadrant, Partial Cloverleaf A Interchange using GEOPAK **(2 Hour)**
- **Lab 13:** Design Project Part 4 - Design the Freeway Exit Ramp of the Grade-Separated, Two-Quadrant, Partial Cloverleaf A Interchange using GEOPAK **(2 Hour)**
- **Lab 14:** Design Project Part 5 - Define the Superelevation & Complete the Grade-Separated, Two-Quadrant, Partial Cloverleaf A Interchange using MicroStation and GEOPAK **(2 Hour)**

G. Examination Scheme:

IA			EE			
A	**PR**	**Practical Based Test**	**Major Experiment**	**Minor Experiment**	**LR**	**Viva**
5	10	15	35	15	10	10

Note: IA –InternalAssessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Text/Reference Books:

- Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Revised 10th Edition, Nem Chand & Bros, 2017
- Kadiyalai, L.R., ' Traffic Engineering and Transport Planning', Khanna Publishers.
- Partha Chakraborty, ' Principles Of Transportation Engineering, PHI Learning, Tomlinson
- Fred L. Mannering, Scott S. Washburn, Walter P. Kilareski,'Principles of Highway Engineering and Traffic Analysis', 4th Edition, John Wiley
- Srinivasa Kumar, R, Textbook of Highway Engineering, Universities Press, 2011.
- Paul H. Wright and Karen K. Dixon, Highway Engineering, 7th Edition, Wiley Student Edition, 2009.

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I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	**Lab 1:** Introduction to MicroStation - Learn the basics of MicroStation required to operate GEOPAK	Lecture	CIV622.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
2	**Lab 2:** Leg Centerline and Lanes using MicroStation - Learn the basics of MicroStation required to operate GEOPAK by drawing a simple leg centerline and lanes.	Lecture	CIV622.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
3	**Lab 3:** Areas & Dimensioning using MicroStation - Learn the concepts of points, lines, direction, distance, traverse, bearing and distance, Northing and Easting, dimensioning, and area measurement	Lecture	CIV622.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
4	*Pavement Edge Design using a Simple Arc with & without a Taper using MicroStation - Learn pavement edge design & vehicle off-tracking concepts using IGIDS-created vehicle turn template. Observe the reduction in circular arc radius and area when a taper section is added.*	Lecture	CIV622.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
5	Horizontal Circular Curve using GEOPAK - Learn how to place a horizontal circular curve using GEOPAK	Lecture	CIV622.1	Internal Assessment, Lab Record, Quiz and End Sem Exam
6	Performing Lab 2 (Leg Centerline & Lanes) using	Lecture	CIV622.1	Internal Assessment, Lab

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	GEOPAK - Learn horizontal alignment design using GEOPAK			Record, Quiz and End Sem Exam
7	Define Superelevation Runoff using GEOPAK - Learn superelevation runoff design using GEOPAK	Lecture	CIV622.2	Mid Term-1, Quiz & End Sem Exam
8	Define a Spiral Curve using GEOPAK - Learn spiral curve design using GEOPAK. Define a Vertical Profile using GEOPAK - Learn vertical alignment design using GEOPAK	Lecture	CIV622.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
9	Design Project Part 1 - Define the Vertical Alignment for Road 2000 over the Freeway using GEOPAK	Lecture	CIV622.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
10	Design Project Part 2 & 3 - Design the Intersection Channelization of the Grade-Separated, Two-Quadrant, Partial Cloverleaf A Interchange using MicroStatio	Lecture	CIV622.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
11	Design Project Part 4 - Design the Freeway Exit Ramp of the Grade-Separated, Two-Quadrant, Partial Cloverleaf A Interchange using GEOPAK	Lecture	CIV622.2	Internal Assessment, Lab Record, Quiz and End Sem Exam
12	Design Project Part 5 - Define the Superelevation & Complete the Grade-Separated, Two-Quadrant, Partial Cloverleaf A Interchange using MicroStation and GEOPAK	Lecture	CIV622.2	Internal Assessment, Lab Record, Quiz and 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		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV622.1	Use the features of MicroStation, GEOPAK, and engineering judgment to design one side of a grade-separated, Two-Quadrant, Partial Cloverleaf A Interchange as depicted in AASHTO 2004.	3	3	1	3	1	**2**			2		2	1	**1**	**1**	**3**
CIV622.2	Learn to work on a team and make effective project presentations and recognize the value of interactions with other professional disciplines.	3	2	2	3	2				2	**2**	1	3	**3**	**2**	**3**

Sample Question Paper

Amity School of Engineering and Technology Department of Civil Engineering I MID-SEMESTER (SEM–VI) 2023-24		
Class: B.Tech.(CE) VI Semester		
Subject Name: CIV 622 GEOMETRIC DESIGN OF	Time: 2 Hrs	Max.Marks:30

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HIGHWAYS LAB						
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

CO1: *U*se the features of MicroStation, GEOPAK, and engineering judgment to design one side of a grade-separated, Two-Quadrant, Partial Cloverleaf A Interchange as depicted in AASHTO 2004.

CO2: Learn to work on a team and make effective project presentations and recognize the value of interactions with other professional disciplines.

CO Map	Question No.	Question	Marks
CO1	Q.1	What is mean by geometric design?	3
CO1	Q.2a	What are the elements in geometric design?	3
	Q.2b	What are the design factors are allowed in geometric design?	3
CO1	Q.3	What is meant by centrifugal ratio and effects of ratio?	6
CO2	Q.4	What are the categories allowed in gradients?	3
CO2	Q.5a	What are the factors considered in horizontal alignment?	3
	Q.5b	Define the formula for centrifugal force?	3
CO2	Q6	Define design speed. Define gradient.	6

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
B.Tech (Civil Engineering)
2021-2025
Exam Result For (Semester) : VI
Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	CIV622 GEOMETRIC DESIGN OF HIGHWAYS LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U7G7
1	A60215821003	Mr SHAD KHAN	100	30	70	A	9	1	1	9
2	A60215821004	Mr SOHAM UPADHYAY	100	30	70	A+	10	1	1	10
			Total No. of Students			=	2			
			Total No. of Students			>60 % marks	2	100.00	%	
			Attainment Level					Level 3		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : DESIGN OF CONCRETE STRUCTURES
Course Code : CIV 701, Crédits : 04, Session :2023-24 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. P. Mahakavi

A. Introduction: The objective of this course is to understand the basic concepts of Limit state design and to obtain the knowledge of using Indian standard codes and special publication. It aims to know the design concepts of all the structural members and learn economical design formaterials saving and to know the design methodologies by limit state design for the beams, slabs, column andfootings.

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

CIV701.1.*Apply the usage of IS codes in design of reinforced concrete structures*
CIV701.2.*Identify the types and design of beams and slabs*
CIV701.3.*Design the uniaxial and biaxial bending of column*
CIV701.4.*Design the simple footings and combined footings*
CIV701.5.*Design the structural members for shear, bond and development length*

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

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PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. 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.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems
PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment
PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home	S/V/Q/H	10%

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	Assignment	A	
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentt o be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examinatio n	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: (8 Hours)

Study of the strength, behavior, and design of indeterminate reinforced concrete structures, Load and stresses, load combinations, Working stress and limit state approach.

Module II: (8 Hours)

Analysis and design of sections in bending – working stress and limit state method, Rectangular and T-sections, Beams with reinforcement in compression. Design for shear and bond, Mechanism of shear and bond failure, Design of shear using limit state concept, Development length of bars; Design of sections in torsion.

Module III: (8 Hours)

One-way slab, Design of two-way slabs; Design of flat slab – direct method; Circular slab; Slab type staircase, Placement of reinforcement in slabs; Voided slab.

Module IV: (8 Hours)

Design of compression members, Short column, Columns with uni-axial and bi-axial bending; Long columns, use of design charts.

Module V: (8 Hours)

Design of foundation; Wall footing, Isolated and combined footing for columns.

G. Examination Scheme:

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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

H. Suggested Text/Reference Books:

- Pillai S.U. & Menon D., Reinforced Concrete Design Tata McGraw Hill, 2003
- Varghese P.C., Limit State Design of Reinforced Concrete, Prentice Hall of India, 2003
- Mallick S.K. & Gupta A.K., Reinforced Concrete, Oxford & IBH, 1982
- Jain A.K., Reinforced Concrete - Limit State Design, Standard Book House, 1998
- Punmia B.C., Reinforced Concrete Structures Vol. I, Standard Book House,2005
- Jain & Jaikrishna, Plain & Reinforced Concrete Vol. I, Nemchand, 2000
- Sinha S.N., Reinforced Concrete Design, Tata McGraw Hill, 2005
- BIS codes (IS 456, SP 16, SP 24, SP 34)

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Study of the strength	Lecture	CIV701.1	Mid Term-1, Quiz & End Sem Exam
2	behavior	Lecture	CIV701.1	Mid Term-1, Quiz & End Sem Exam
3	design of indeterminate reinforced concrete structures	Lecture	CIV701.1	Mid Term-1, Quiz & End Sem Exam
4	Load	Lecture	CIV701.1	Mid Term-1, Quiz & End Sem Exam
5	stresses	Lecture	CIV701.1	Mid Term-1, Quiz & End Sem Exam
6	load combinations	Lecture	CIV701.1	Mid Term-1, Quiz & End Sem Exam
7	Working stress method	Lecture	CIV701.1	Mid Term-1, Quiz & End Sem Exam
8	limit state approach	Lecture	CIV701.1	Mid Term-1, Quiz & End Sem Exam
9	Analysis and design of sections in bending	Lecture	CIV701.2	Mid Term-1, Quiz & End Sem Exam
10	working stress and limit state method	Lecture	CIV701.2	Mid Term-1, Quiz

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				& End Sem Exam
11	Rectangular and T-sections	Lecture	CIV701.2	Mid Term-1, Quiz & End Sem Exam
12	Beams with reinforcement in compression	Lecture	CIV701.2	Mid Term-1, Quiz & End Sem Exam
13	Design for shear and bond	Lecture	CIV701.2	Mid Term-1, Quiz & End Sem Exam
14	Mechanism of shear and bond failure	Lecture	CIV701.2	Mid Term-1, Quiz & End Sem Exam
15	Design of shear using limit state concept	Lecture	CIV701.2	Mid Term-1, Quiz & End Sem Exam
16	Development length of bars; Design of sections in torsion	Lecture	CIV701.2	Mid Term-1, Quiz & End Sem Exam
17	One-way slab	Lecture	CIV701.3	Mid Term-1, Quiz & End Sem Exam
18	Design of two-way slabs	Lecture	CIV701.3	Mid Term-1, Quiz & End Sem Exam
19	Design of flat slab	Lecture	CIV701.3	Mid Term-1, Quiz & End Sem Exam
20	direct method	Lecture	CIV701.3	Mid Term-1, Quiz & End Sem Exam
21	Circular slab	Lecture	CIV701.3	Assignment, Quiz & End Sem Exam
22	Slab type staircase	Lecture	CIV701.3	Assignment, Quiz & End Sem Exam
23	Placement of reinforcement in slabs	Lecture	CIV701.3	Assignment, Quiz & End Sem Exam
24	Voided slab	Lecture	CIV701.3	Assignment, Quiz & End Sem Exam
25	Design of compression members	Lecture	CIV701.4	Assignment, Quiz & End Sem Exam
26	Short column	Lecture	CIV701.4	Assignment, Quiz & End Sem Exam
27	Columns with uni-axial bending	Lecture	CIV701.4	Assignment, Quiz & End Sem Exam
28	Columns with uni-axial bending	Lecture	CIV701.4	Assignment, Quiz & End Sem Exam
29	Columns with bi-axial bending	Lecture	CIV701.4	Assignment, Quiz & End Sem Exam
30	Columns with bi-axial bending	Lecture	CIV701.4	Assignment, Quiz & End Sem Exam
31	Long columns	Lecture	CIV701.4	Assignment, Quiz

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				& End Sem Exam
32	use of design charts	Lecture	CIV701.4	Assignment, Quiz & End Sem Exam
33	Design of foundation	Lecture	CIV701.5	Assignment, Quiz & End Sem Exam
34	Design of foundation	Lecture	CIV701.5	Assignment, Quiz & End Sem Exam
35	Design of foundation	Lecture	CIV701.5	Assignment, Quiz & End Sem Exam
36	Design of foundation	Lecture	CIV701.5	Mid Term-1, Quiz & End Sem Exam
37	Design of foundation	Lecture	CIV701.5	Mid Term-1, Quiz & End Sem Exam
38	Design of foundation	Lecture	CIV701.5	Mid Term-1, Quiz & End Sem Exam
39	Wall footing for columns	Lecture	CIV701.5	Mid Term-1, Quiz & End Sem Exam
40	Wall footing for columns	Lecture	CIV701.5	Mid Term-1, Quiz & End Sem Exam
41	Wall footing for columns	Lecture	CIV701.5	Mid Term-1, Quiz & End Sem Exam
42	Wall footing for columns	Lecture	CIV701.5	Mid Term-1, Quiz & End Sem Exam
43	Isolated footing for columns	Lecture	CIV701.5	Mid Term-1, Quiz & End Sem Exam
44	Isolated footing for columns	Lecture	CIV701.5	Mid Term-1, Quiz & End Sem Exam
45	Isolated footing for columns	Lecture	CIV701.5	Mid Term-1, Quiz & End Sem Exam
46	Combined footing for columns	Lecture	CIV701.5	Mid Term-1, Quiz & End Sem Exam
47	combined footing for columns	Lecture	CIV701.5	Mid Term-1, Quiz & End Sem Exam
48	combined footing for columns	Lecture	CIV701.5	Mid Term-1, Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES	CORRELATION WITH PROGRAMME SPECIFIC

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														OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV701.1.	Apply the usage of IS codes in design of reinforced concrete structures	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
CIV701.2.	Identify the types and design of beams and slabs	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV701.3.	Design the uniaxial and biaxial bending of column	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
CIV701.4.	Design the simple footings and combined footings	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**
CIV701.5.	Design the structural members for shear, bond and development length	3	3	2	3	3	2	2	-	3	2	3	3	**1**	**2**	**3**

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SampleQuestionPaper

Amity School of Engineering and Technology Departmentof Civil Engineering IMID-SEMESTER(SEM–VII)2023-24						
Class:B.Tech. (CE) VIISemester						
SubjectName: CIV701DESIGN OF CONCRETE STRUCTURES		Time:2 Hrs		Max.Marks: 30		
Levels of thequestions as perBloomsTaxonomy	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Question mapping	Q.1,4	Q.2,3	Q.4	Q.2,5,6		
Student willbeableto CO1:Apply the usage of IS codes in design of reinforced concrete structures CO2: Identify the types and design of beams and slabs						

COMap	QuestionNo.	Question	Marks
CO1	Q.1	Explaininbriefthecloudcomputingconcept.	3
CO1	Q.2a	Whataretheessentialcharacteristicsofcloudcomputing?	3
	Q.2b	Howiscloudcomputingrequirementsandclouds ervicerequirementservicesrelatedto eachother?	3
CO1	Q.3	Sketch NIST Cloud Computing Reference Architecture and depictitselements	6
CO2	Q.4	ExplainthesignificanceofCloudReferenceModel	3
CO2	Q.5a	Elaboratedifferentcloudtypeswithexample.	3
	Q.5b	Writecharacteristicsofprivatecloud.	3
CO2	Q6	Howvirtualizationisapplied incloudcomputingscenario?	6

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Attainments		Rubric
Level	1	IF60%ofstudentssecuremorethan 60%marksthenlevel1
Level	2	IF70%ofstudentssecuremorethan 60%marksthenlevel2
Level	3	IF80%ofstudentssecuremorethan 60%marksthenlevel3

Amity University Madhya Pradesh
B.Tech (Civil Engineering)
2020-2024
Exam Result For (Semester) : VII
Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	CIV701 DESIGN OF CONCRETE STRUCTURES							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U1G1
1	A60215820001	Mr ABHI PRATAP	100	30	70	B+	7	4	4	28
2	A60215820002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	C+	4	4	4	16
3	A60215820003	Mr SHYAM VEER SINGH	100	30	70	B+	7	4	4	28
4	A60215820004	Mr SAHIL SHARMA	100	30	70	B+	7	4	4	28
			Total No. of Students			=	4			
			Total No. of Students			>60 % marks	0	0.00	%	
			Attainment Level					-		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course :SURFACE HYDROLOGY
Course Code : CIV 702, Crédits : 03, Session :2023-24 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Imran Ahmad Khan

A. ***Introduction:*** *The objective of this course is* to understand the physical processes that determines the exchange of water at the Earth's surface and to become familiar with the physical properties that govern the movement of water throughthe unsaturated zone and how these can be observed in the field and modelled mathematically. It aims to understand the physical factors that control evaporation and their representation usingenergy fluxes and diffusive transfer.

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

CIV702.1. Understand the process and mathematical representation of hydrologic cycle
CIV702.2. Differentiate the measure and apply precipitation for hydrologic design
CIV702.3. Understand the importance of catchment characteristics for runoff estimation
CIV702.4. Comprehend unit hydrograph theory and its applications to hydrologic design

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

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PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. 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.

D. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %

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Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: (7 Hours)

Introduction hydrologic cycle, water budget equations, world water balance, application in engineering. Precipitation: Forms of precipitation, measurement, depth-area-duration & intensity- duration- frequency relationships, probable maximum precipitation.

Module II: (8 Hours)

Abstraction from Precipitation: Evaporation – process, measurement and estimation; Evapotranspiration- measurement and estimation; Initial Losses- Interception & Depression storage; Infiltration- process, capacities, indices, measurement & estimation

Module III: Runoff and Hydrographs: (7 Hours)

Hydrograph, runoff characteristics of stream, Yield, Rainfall-runoff correlations, flow duration curve, mass curve, droughts and floods. Factors affecting flood hydrographs, unit hydrograph and its analysis, s-curve hydrograph, synthetic and instantaneous unit hydrographs.

Module IV: Flood: (8 Hours)

Rational method, empirical formulae, unit hydrograph method, flood frequency studies, statistical analysis, regional flood frequency analysis, design storm & design flood, risk/reliability and safety factor; Flood Routing: Basic equation, hydrologic storage routing & attenuation, hydrologic channel routing, flood forecasting & control, hydraulic method of flood routing.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE

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Weightage (%)	5	15	10	70

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

H. Suggested Text/Reference Books:

- 'Hydrology for Engineers' by Linsley R. K., Kohler M. A. and Paulhus J. L. H.
- 'Engineering Hydrology' by K. Subramanya
- 'Hydrology: Principles. Analysis. Design' by Raghunath H. M.
- 'Handbook of Applied Hydrology' by Chow V. T.
- 'Irrigation: Theory & Practice' by Michael A. M.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction hydrologic cycle	Lecture	CIV 702.1	Mid Term-1, Quiz & End Sem Exam
2	water budget equations	Lecture	CIV 702.1	Mid Term-1, Quiz & End Sem Exam
3	world water balance	Lecture	CIV 702.1	Mid Term-1, Quiz & End Sem Exam
4	application in engineering	Lecture	CIV 702.1	Mid Term-1, Quiz & End Sem Exam
5	Precipitation	Lecture	CIV 702.1	Mid Term-1, Quiz & End Sem Exam
6	Forms of precipitation	Lecture	CIV 702.1	Mid Term-1, Quiz & End Sem Exam
7	measurement	Lecture	CIV 702.1	Mid Term-1, Quiz & End Sem Exam
8	depth-area-duration	Lecture	CIV 702.1	Mid Term-1, Quiz & End Sem Exam
9	depth-area-duration	Lecture	CIV 702.1	Mid Term-1, Quiz & End Sem Exam
10	intensity- duration- frequency relationships	Lecture	CIV 702.2	Mid Term-1, Quiz & End Sem Exam
11	probable maximum precipitation	Lecture	CIV 702.2	Mid Term-1, Quiz & End Sem Exam
12	probable maximum precipitation	Lecture	CIV 702.2	Mid Term-1, Quiz & End Sem Exam
13	Abstraction from Precipitation	Lecture	CIV 702.2	Mid Term-1, Quiz & End Sem Exam
14	Evaporation	Lecture	CIV 702.2	Mid Term-1, Quiz

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				& End Sem Exam
15	Evaporation – process	Lecture	CIV 702.2	Mid Term-1, Quiz & End Sem Exam
16	measurement and estimation	Lecture	CIV 702.2	Mid Term-1, Quiz & End Sem Exam
17	Evapotranspiration	Lecture	CIV 702.2	Mid Term-1, Quiz & End Sem Exam
18	measurement and estimation	Lecture	CIV 702.2	Mid Term-1, Quiz & End Sem Exam
19	Initial Losses	Lecture	CIV 702.3	Mid Term-1, Quiz & End Sem Exam
20	Interception	Lecture	CIV 702.3	Mid Term-1, Quiz & End Sem Exam
21	Depression storage	Lecture	CIV 702.3	Assignment, Quiz & End Sem Exam
22	Infiltration- process	Lecture	CIV 702.3	Assignment, Quiz & End Sem Exam
23	capacities, indices	Lecture	CIV 702.3	Assignment, Quiz & End Sem Exam
24	measurement & estimation	Lecture	CIV 702.3	Assignment, Quiz & End Sem Exam
25	Hydrograph	Lecture	CIV 702.3	Assignment, Quiz & End Sem Exam
26	runoff characteristics of stream	Lecture	CIV 702.3	Assignment, Quiz & End Sem Exam
27	Yield	Lecture	CIV 702.3	Assignment, Quiz & End Sem Exam
28	Rainfall-runoff correlations	Lecture	CIV702.4	Assignment, Quiz & End Sem Exam
29	flow duration curve	Lecture	CIV702.4	Assignment, Quiz & End Sem Exam
30	mass curve, droughts and floods..	Lecture	CIV702.4	Assignment, Quiz & End Sem Exam
31	Factors affecting flood hydrographs	Lecture	CIV702.4	Assignment, Quiz & End Sem Exam
32	unit hydrograph and its analysis	Lecture	CIV702.4	Assignment, Quiz & End Sem Exam
33	s-curve hydrograph	Lecture	CIV702.4	Assignment, Quiz & End Sem Exam
34	synthetic and instantaneous unit hydrographs	Lecture	CIV702.4	Assignment, Quiz & End Sem Exam
35	Rational method, empirical	Lecture	CIV702.4	Assignment, Quiz

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	formulae, unit hydrograph method, flood frequency studies, statistical analysis, regional flood frequency analysis,			& End Sem Exam
36	design storm & design flood, risk/reliability and safety factor; Flood Routing: Basic equation, hydrologic storage routing & attenuation, hydrologic channel routing, flood forecasting & control, hydraulic method of flood routing.	Lecture	CIV702.4	Mid Term-1, Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV702.1.	Understand the process and mathematical representation of hydrologic cycle	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
CIV702.2.	Differentiate the measure and apply precipitation for hydrologic design	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV702.3.	Understand the importance of catchment characteristics for runoff estimation	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
CIV702.4.	Comprehend unit hydrograph theory and its applications	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**

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	to hydrologic design															

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B.Tech (Civil Engineering)
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Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment. No.	Student's Name	CIV702 SURFACE HYDROLOGY							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U2G2
1	A602158200001	Mr ABHI PRATAP	100	30	70	A-	8	3	3	24
2	A602158200002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	A	9	3	3	27
3	A602158200003	Mr SHYAM VEER SINGH	100	30	70	A+	10	3	3	30
4	A602158200004	Mr SAHIL SHARMA	100	30	70	A+	10	3	3	30
			Total No. of Students			=	4			
			Total No. of Students			>60 % marks	4	100.00	%	
			Attainment Level					Level 3		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course :PRE-STRESSED CONCRETE
Course Code : CIV 706, Crédits : 03, Session :2023-24 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi, Mr. Sachin Tiwari

K. Introduction: The objective of this course is to understand the concepts of pre-tensioning and post-tensioning members. Analyse the flexural member.Design a prestressed concrete beam accounting for losses. Calculate the deflection and crack width of prestressed members. Design the flexural member.Design the member subjected to shear.Design the composite members.

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

CIV706.1. Learn the principles, materials, methods and systems of prestressing

CIV706.2 Know the different types of losses and deflection of prestressed members

CIV706.3 Design of prestressed concrete beams for flexural, shear and tension and to calculate ultimate flexural strength of beam

CIV706.4 Design of anchorage zones, composite beams

M. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

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PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. 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.

N. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

O. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %

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Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

P. Syllabus

Module I: Materials for Prestressed Concrete and Prestressing Systems: (8 Hours)
High strength concrete and high tensile steel – tensioning devices – pretensioning systems – post tensioning systems.

Module II: Analysis of Prestress and Bending Stresses: (7 Hours)
Analysis of prestress – resultant stresses at a sector – pressure line or thrust line and internal resisting couple – concept of load balancing – losses of prestress – deflection of beams.

Module III: Strength of Prestressed Concrete Sections in Flexure, Shear and Torsion: (8 Hours)
Types of flexural failure – strain compatibility method – IS code procedure – design for limit state of shear and torsion.

Module IV: Design of Prestressed Concrete Beams and Slabs: (7 Hours)
Transfer of prestress in pre tensioned and post tensioned members – design of anchorage zone reinforcement – design of simple beams – cable profiles – design of slabs.
A design project for the design and detailing of a large span beam is envisaged at this stage.

Q. 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

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R. Suggested Text/Reference Books:

- N. Krishna Raju, Prestressed concrete, Tata McGraw Hill, 2000
- T.Y. Lin, Ned H. Burns, Design of Prestressed Concrete Structures, John Wiley & Sons, 2004.
- P. Dayaratnam, Prestressed Concrete, Oxford & IBH,1982
- R. Rajagopalan, Prestressed Concrete, Narosa publishers, 2004.
- BIS codes (IS 1343)

S. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	High strength concrete and high tensile steel	Lecture	CIV 706.1	Mid Term-1, Quiz & End Sem Exam
2	High strength concrete and high tensile	Lecture	CIV 706.1	Mid Term-1, Quiz & End Sem Exam
3	High strength concrete and high tensile steel.	Lecture	CIV 706.1	Mid Term-1, Quiz & End Sem Exam
4	tensioning devices	Lecture	CIV 706.1	Mid Term-1, Quiz & End Sem Exam
5	*tensioning devices*	Lecture	CIV 706.1	Mid Term-1, Quiz & End Sem Exam
6	tensioning devices	Lecture	CIV 706.1	Mid Term-1, Quiz & End Sem Exam
7	pretensioning systems – post tensioning systems.	Lecture	CIV 706.1	Mid Term-1, Quiz & End Sem Exam
8	pretensioning systems – post tensioning systems.Process	Lecture	CIV 706.1	Mid Term-1, Quiz & End Sem Exam
9	pretensioning systems – post tensioning systems.	Lecture	CIV 706.1	Mid Term-1, Quiz & End Sem Exam
10	Analysis of prestress	Lecture	CIV 706.2	Mid Term-1, Quiz & End Sem Exam
11	Analysis of prestress	Lecture	CIV 706.2	Mid Term-1, Quiz & End Sem Exam
12	resultant stresses at a sector	Lecture	CIV 706.2	Mid Term-1, Quiz & End Sem Exam
13	pressure line or thrust line	Lecture	CIV 706.2	Mid Term-1, Quiz & End Sem Exam
14	internal resisting couple	Lecture	CIV 706.2	Mid Term-1, Quiz & End Sem Exam
15	concept of load balancing	Lecture	CIV 706.2	Mid Term-1, Quiz & End Sem Exam
16	losses of prestress	Lecture	CIV 706.2	Mid Term-1, Quiz

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				& End Sem Exam
17	deflection of beams	Lecture	CIV 706.2	Mid Term-1, Quiz & End Sem Exam
18	deflection of beams	Lecture	CIV 706.2	Mid Term-1, Quiz & End Sem Exam
19	Types of flexural failure	Lecture	CIV 706.3	Mid Term-1, Quiz & End Sem Exam
20	Types of flexural failure	Lecture	CIV 706.3	Mid Term-1, Quiz & End Sem Exam
21	strain compatibility method	Lecture	CIV 706.3	Assignment, Quiz & End Sem Exam
22	strain compatibility method	Lecture	CIV 706.3	Assignment, Quiz & End Sem Exam
23	IS code procedure	Lecture	CIV 706.3	Assignment, Quiz & End Sem Exam
24	IS code procedure	Lecture	CIV 706.3	Assignment, Quiz & End Sem Exam
25	design for limit state of shear	Lecture	CIV 706.3	Assignment, Quiz & End Sem Exam
26	design for limit state of shear	Lecture	CIV 706.3	Assignment, Quiz & End Sem Exam
27	design for limit state of torsion.	Lecture	CIV 706.3	Assignment, Quiz & End Sem Exam
28	Transfer of prestress in pre tensioned members	Lecture	CIV 706.4	Assignment, Quiz & End Sem Exam
29	Transfer of prestress in post tensioned members	Lecture	CIV 706.4	Assignment, Quiz & End Sem Exam
30	design of anchorage zone	Lecture	CIV 706.4	Assignment, Quiz & End Sem Exam
31	design of anchorage zone.	Lecture	CIV 706.4	Assignment, Quiz & End Sem Exam
32	reinforcement	Lecture	CIV 706.4	Assignment, Quiz & End Sem Exam
33	design of simple beams	Lecture	CIV 706.4	Assignment, Quiz & End Sem Exam
34	cable profiles	Lecture	CIV 706.4	Assignment, Quiz & End Sem Exam
35	design of slabs.	Lecture	CIV 706.4	Assignment, Quiz & End Sem Exam
36	design of slabs.	Lecture	CIV 706.4	Assignment, Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV706.1	Learn the principles, materials, methods and systems of prestressing	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
CIV706.2	Know the different types of losses and deflection of prestressed members	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV706.3	Design of prestressed concrete beams for flexural, shear and tension and to calculate ultimate flexural strength of beam	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
CIV706.4	CIV706.4 Design of anchorage zones, composite beams	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**

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Amity University Madhya Pradesh

B.Tech (Civil Engineering)

2020-2024

Exam Result For (Semester) : VII

Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment.No.	Student's Name	CIV706 PRE-STRESSED CONCRETE							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U3G3
1	A60215820001	Mr ABHI PRATAP	100	30	70	C+	4	3	3	12
2	A60215820002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	B-	5	3	3	15
3	A60215820003	Mr SHYAM VEER SINGH	100	30	70	B-	5	3	3	15
4	A60215820004	Mr SAHIL SHARMA	100	30	70	B-	5	3	3	15
			Total No. of Students			=	4			
			Total No. of Students			>60 % marks	0	0.00	%	
			Attainment Level					-		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : SURFACE HYDROLOGY LAB
Course Code : CIV 722, Crédits : 01, Session :2023-24 (Odd Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Vimal Kumar Gupta, Dr. Mohan Kantharia, Dr. Imran Ahmad Khan, Dr. Ripunjoy Gogoi, Dr. P. Mahakavi, Mr. Sachin Tiwari

K. ***Introduction:*** The objective of this course is to understand the physical processes that determines the exchange of water at the Earth's surface.To become familiar with the physical properties that govern the movement of water throughthe unsaturated zone and how these can be observed in the field and modelled mathematically.To be able to understand the processes which influence runoff from catchments and themethods for estimating the runoff. To use measured / estimated data like precipitation, runoff, infiltration, for hydrologic design

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

CIV722.1*Understand the process and mathematical representation of hydrologic cycle*

CIV722.2 *Understand the importance of catchment characteristics for runoff estimation*

CIV722.3. Evaluate the hydrologic abstractions and also learn about the factors affecting various
hydrologic abstractions

CIV722.4 *Implementing the knowledge of precipitation and runoff measurement in hydrologic design*

M. **Programme Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

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PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

PO12. 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.

N. Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and

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management tools so as to complete the civil engineering project within specified time and funds.

O. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

P. Syllabus

1. To draw the hydrological cycle showing different transportation and storage components: (2 Hours)
2. To draw the depth-area-duration relationship for a particular catchment area: (2 Hours)
3. To draw the intensity- duration- frequency relationship for a particular catchment area: (2 Hours)
4. To study the rainfall-runoff correlations for a particular catchment area: (2 Hours)
5. To draw the flow duration curve for a particular catchment area: (2 Hours)
6. To draw the mass curve for a particular catchment area: (2 Hours)
7. To draw the flood hydrograph for a particular catchment area and particular storm: (2 Hours)
8. To draw the unit hydrograph for a particular catchment area and particular storm: (2 Hours)
9. To construct the unit hydrograph of different duration with the help of method of superposition:(2 Hours)
10. To construct the unit hydrograph of different duration with the help of S-curve method: (2 Hours)

Q. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

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

R. Suggested Text/Reference Books:

- 'Hydrology for Engineers' by Linsley R. K., Kohler M. A. and Paulhus J. L. H.
- 'Engineering Hydrology' by K. Subramanya
- 'Hydrology: Principles. Analysis. Design' by Raghunath H. M.
- 'Handbook of Applied Hydrology' by Chow V. T.
- 'Irrigation: Theory & Practice' by Michael A. M.

S. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	To draw the hydrological cycle showing different transportation and storage components	Practical	CIV722.1	Mid Term-1, Quiz & End Sem Exam
2	To draw the depth-area-duration relationship for a particular catchment area	Practical	CIV722.1	Mid Term-1, Quiz & End Sem Exam
3	To draw the intensity- duration-frequency relationship for a particular catchment area	Practical	CIV722.1	Mid Term-1, Quiz & End Sem Exam
4	To study the rainfall-runoff correlations for a particular catchment area	Practical	CIV722.2	Mid Term-1, Quiz & End Sem Exam
5	To draw the flow duration curve for a particular catchment area	Practical	CIV722.2	Mid Term-1, Quiz & End Sem Exam
6	To draw the mass curve for a particular catchment area	Practical	CIV722.2	Mid Term-1, Quiz & End Sem Exam
7	To draw the flood hydrograph for a particular catchment area and particular storm	Practical	CIV722.3	Mid Term-1, Quiz & End Sem Exam
8	To draw the unit hydrograph for a particular catchment area and particular storm	Practical	CIV722.3	Mid Term-1, Quiz & End Sem Exam
9	To construct the unit hydrograph of different duration with the help of method of superposition	Practical	CIV722.3	Mid Term-1, Quiz & End Sem Exam
10	To construct the unit hydrograph of different duration with the help of method of superposition	Practical	CIV722.4	Mid Term-1, Quiz & End Sem Exam
11	To construct the unit hydrograph of different duration with the help of S-curve method	Practical	CIV722.4	Mid Term-1, Quiz & End Sem Exam
12	To construct the unit hydrograph of different duration with the help of S-curve method	Practical	CIV722.4	Mid Term-1, Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV722.1	Understand the process and mathematical representation of hydrologic cycle	3	3	2	2	2	-	1	-	3	2	3	3	**3**	**2**	**1**
CIV722.2	CIV722.2 Understand the importance of catchment characteristics for runoff estimation	3	3	2	3	3	2	2	-	3	2	3	3	**3**	**1**	**2**
CIV722.3.	Evaluate the hydrologic abstractions and also learn about the factors affecting various hydrologic abstractions	3	3	2	2	3	-	2	-	3	2	3	3	**2**	**3**	**1**
CIV722.4	Implementing the knowledge of precipitation and runoff measurement in hydrologic design	3	3	2	1	1	2	1	-	1	2	3	3	**1**	**2**	**1**

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B.Tech (Civil Engineering)
2020-2024
Exam Result For (Semester) : VII
Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment. No.	Student's Name	CIV722 SURFACE HYDROLOGY LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U4G4
1	A602158200001	Mr ABHI PRATAP	100	30	70	A+	10	1	1	10
2	A602158200002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	A	9	1	1	9
3	A602158200003	Mr SHYAM VEER SINGH	100	30	70	A+	10	1	1	10
4	A602158200004	Mr SAHIL SHARMA	100	30	70	A+	10	1	1	10
			Total No. of Students			=	4			
			Total No. of Students			>60% marks	4	100.00	%	
			Attainment Level					Level 3		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : DESIGN OF STEEL STRUCTURES
Course Code : CIV 801, Crédits : 04, Session : 2023-24 (Even Sem.), Class : B.Tech. 4th Year
Faculty Name : Mr. Sachin Tiwari

A. Introduction

This course aims at providing students with a solid background on principles of steel structural engineering design. Students will be exposed to the theories and concepts of steel design and analysis both at the element and system levels. Hands-on design experience and skills will be gained and learned through problem sets and a comprehensive design project. An understanding of real-world open-ended design issues will be developed. Weekly recitations and project discussions will be held besides lectures.

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

- **CIV801.1.**Ability to design and analyze steel structures.
- **CIV801.2.**The students will be able to apply their knowledge of steel structural mechanics in addressing design problems of steel structural engineering.
- **CIV801.3.**They will possess the skills to solve problems dealing with different loads and steel
- **CIV801.4.**They will have knowledge in steel structural engineering.

B. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

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PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. 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.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage
Continuous	Mid Term 1	CT	15%

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Internal Evaluation	Mid Term 2		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			100%

F. Course Content

Module I: Introduction To Load and Stresses on Steel Structures: Properties of materials; loads and stresses, design of semi-rigid, rigid and moment resistant connections.

Module II: Design of Tension and Compression Members: Built-up sections, design of tension members subjected to axial tension and bending, splicing of tension member, design of compression members, beam-column connections.

Module III: Column Design: Design of columns and their bases Design of flexural members and Plate girder; loads, specification and design Industrial buildings; loads.

Module IV: Purlins, Trusses and Girders: Design of purlins, trusses, bracings, gantry girders, introduction to Plastic analysis.

Module V: Overview on Beams and Frames: Simple cases of beams and frames.

G. 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; Att: Attendance

H. Suggested Books

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- McCormac, J.C., Nelson, J.K. Jr., *Structural Steel Design*. 3rd edition. Prentice Hall, N.J., 2003.
- Galambos, T.V., Lin, F.J., Johnston, B.G., *Basic Steel Design with LRFD*, Prentice Hall, 1996
- Segui, W. T., *LRFD Steel Design*, 2nd Ed., PWS Publishing, Boston.
- Salmon, C.G. and Johnson, J.E., *Steel Structures: Design and Behavior*, 3rd Edition, Harper & Row, Publishers, New York, 1990.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Properties of materials	Lecture	CIV 801.1	Mid Term-1, Quiz & End Sem Exam
2	loads and stresses, design of semi connections	Lecture	CIV 801.1	Mid Term-1, Quiz & End Sem Exam
3	loads and stresses, design of semi connections	Lecture	CIV 801.1	Mid Term-1, Quiz & End Sem Exam
4	loads and stresses, design of semi connections	Lecture	CIV 801.1	Mid Term-1, Quiz & End Sem Exam
5	loads and stresses, design of semi rigid connections	Lecture	CIV 801.1	Mid Term-1, Quiz & End Sem Exam
6	rigid and moment resistant connections.	Lecture	CIV 801.1	Mid Term-1, Quiz & End Sem Exam
7	rigid and moment resistant connections.	Lecture	CIV 801.1	Mid Term-1, Quiz & End Sem Exam
8	rigid and moment resistant connections.	Lecture	CIV 801.1	Mid Term-1, Quiz & End Sem Exam
9	rigid and moment resistant connections.	Lecture	CIV 801.1	Mid Term-1, Quiz & End Sem Exam
10	Built-up sections,	Lecture	CIV 801.1	Mid Term-1, Quiz & End Sem Exam
11	design of tension members subjected to axial tension and bending	Lecture	CIV 801.1	Mid Term-1, Quiz & End Sem Exam
12	design of tension members subjected to axial tension and bending	Lecture	CIV 801.1	Mid Term-1, Quiz & End Sem Exam
13	design of tension members subjected to axial tension and bending	Lecture	CIV 801.2	Mid Term-1, Quiz & End Sem Exam
14	design of tension members subjected to axial tension and	Lecture	CIV 801.2	Mid Term-1, Quiz & End Sem Exam

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	bending			
15	splicing of tension member, design of compression members, beam	Lecture	CIV 801.2	Mid Term-1, Quiz & End Sem Exam
16	splicing of tension member, design of compression members, beam	Lecture	CIV 801.2	Mid Term-1, Quiz & End Sem Exam
17	Design of columns and their bases.	Lecture	CIV 801.2	Mid Term-1, Quiz & End Sem Exam
18	Design of columns and their bases Design of flexural members and Plate girder; loads	Lecture	CIV 801.2	Mid Term-1, Quiz & End Sem Exam
19	Design of flexural members and Plate girder; loads	Lecture	CIV 801.2	Mid Term-1, Quiz & End Sem Exam
20	Design of flexural members and Plate girder; loads	Lecture	CIV 801.2	Mid Term-1, Quiz & End Sem Exam
21	Design of flexural members and Plate girder; loads	Lecture	CIV 801.2	Assignment, Quiz & End Sem Exam
22	Design of purlins, trusses, bracings, gantry girders, introduction to Plastic analysis.	Lecture	CIV 801.2	Assignment, Quiz & End Sem Exam
23	Design of purlins, trusses, bracings, gantry girders, introduction to Plastic analysis.	Lecture	CIV 801.2	Assignment, Quiz & End Sem Exam
24	Design of purlins, trusses, bracings, gantry girders, introduction to Plastic analysis.	Lecture	CIV 801.2	Assignment, Quiz & End Sem Exam
25	Design of purlins, trusses, bracings, gantry girders, introduction to Plastic analysis.	Lecture	CIV 801.3	Assignment, Quiz & End Sem Exam
26	Design of purlins, trusses, bracings, gantry girders, introduction to Plastic analysis.	Lecture	CIV 801.3	Assignment, Quiz & End Sem Exam
27	Simple cases of beams and frames.	Lecture	CIV 801.3	Assignment, Quiz & End Sem Exam
28	Simple cases of beams and frames.	Lecture	CIV 801.3	Assignment, Quiz & End Sem Exam
29	Simple cases of beams and frames.	Lecture	CIV 801.3	Assignment, Quiz & End Sem Exam
30	Simple cases of beams and frames.	Lecture	CIV 801.3	Assignment, Quiz & End Sem Exam
31	Simple cases of beams and	Lecture	CIV 801.3	Assignment, Quiz

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	frames.			& End Sem Exam
32	Simple cases of beams and frames.	Lecture	CIV 801.3	Assignment, Quiz & End Sem Exam
33	Simple cases of beams and frames.	Lecture	CIV 801.3	Assignment, Quiz & End Sem Exam
34	Simple cases of beams and frames.	Lecture	CIV 801.3	Assignment, Quiz & End Sem Exam
35	Simple cases of beams and frames.	Lecture	CIV 801.3	Assignment, Quiz & End Sem Exam
36	Simple cases of beams and frames.	Lecture	CIV 801.3	Assignment, Quiz & End Sem Exam
37	Design of purlins, trusses, bracings, gantry girders, introduction to Plastic analysis.	Lecture	CIV 801.4	Assignment, Quiz & End Sem Exam
38	Design of purlins, trusses, bracings, gantry girders, introduction to Plastic analysis.	Lecture	CIV 801.4	Assignment, Quiz & End Sem Exam
39	Simple cases of beams and frames.	Lecture	CIV 801.4	Assignment, Quiz & End Sem Exam
40	Simple cases of beams and frames.	Lecture	CIV 801.4	Assignment, Quiz & End Sem Exam
41	Simple cases of beams and frames.	Lecture	CIV 801.4	Assignment, Quiz & End Sem Exam
42	Simple cases of beams and frames.	Lecture	CIV 801.4	Assignment, Quiz & End Sem Exam
43	Simple cases of beams and frames.	Lecture	CIV 801.4	Assignment, Quiz & End Sem Exam
44	Simple cases of beams and frames.	Lecture	CIV 801.4	Assignment, Quiz & End Sem Exam
45	Simple cases of beams and frames.	Lecture	CIV 801.4	Assignment, Quiz & End Sem Exam
46	Simple cases of beams and frames.	Lecture	CIV 801.4	Assignment, Quiz & End Sem Exam
47	Simple cases of beams and frames.	Lecture	CIV 801.4	Assignment, Quiz & End Sem Exam
48	Simple cases of beams and frames.	Lecture	CIV 801.4	Assignment, Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV 801.1	Ability to design and analyse steel structures.	3	3	1	3	1				2		2	1			
CIV 801.2	The students will be able to apply their knowledge of steel structural mechanics in addressing design problems of steel structural engineering.	3	2	2	2	2				2		1	1			
CIV 801.3	They will possess the skills to solve problems dealing with different loads and steel	3	3	1	3	1				2		2	1			
CIV 801.4	They will have knowledge in steel structural engineering.	3	2	2	2	2				2		1	1			

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B.Tech (Civil Engineering)

2020-2024

Exam Result For (Semester) : VIII

Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment. No.	Student's Name	CIV801 DESIGN OF STEEL STRUCTURES Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U1G1
1	A602158200001	Mr ABHI PRATAP	100	30	70	B+	7	4	4	28
2	A602158200003	Mr SHYAM VEER SINGH	100	30	70	A+	10	4	4	40
3	A602158200004	Mr SAHIL SHARMA	100	30	70	A-	8	4	4	32
4	A602158200002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	B+	7	4	4	28
			Total No. of Students			=	4			
			Total No. of Students			>60 % marks	2	50.00	%	
			Attainment Level					-		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : AIRPORT PLANNING AND DESIGN
Course Code : CIV 802, Crédits : 03, Session : 2023-24 (Even Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Ripunjoy Gogoi

A. Introduction

This course aims at providing students with a solid background on principles of airport planning and design. Students will be exposed to the theories and concepts of airport design. Hands-on design experience and skills will be gained and learned through problem sets and a comprehensive design project.

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

- **CIV 802.1**.Design and analyze airports.
- **CIV 802.2**. Understand the skills to solve problems dealing with different airport design problems.
- **CIV 803.3**. Identify the alignment and length of airport runway and draw an airport layout.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

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PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. 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.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

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 isrequiredtobemaintainedbyastudentt	A	5%

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	o be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			100%

E. Course Content

Module I: Introduction: Aircraft characteristics, aircraft performance characteristics, airport planning and air travel demand forecasting.

Module II: Airport Site Selection and Geometric Design: Airport site selection, geometric design of the airfield, determination of runway capacity and delay, taxiway and gate capacity, holding aprons, terminal aprons, airport drainage.

Module III: Function of Airport Passenger and Cargo Terminal: Function of Airport Passenger and Cargo Terminal - Design of Air Freight Terminals, Airport access - Airport Landside planning – Capacity.

Module IV: Air Traffic Management: Air Traffic Management, navigational aids, ground based systems, satellite based systems.

Module V: Air Traffic Control and Surveillance Facilities: Air traffic control and surveillance facilities, airfield lighting, air traffic management.

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; Att: Attendance

G. Suggested Books

- "Planning and Design of Airports" by Robert Horonjeff Francis X. McKelvey William J. Sproule Seth B. Young, Fifth Edition, Mcgraw Hill, 2010.

H. Lecture Plan

Lecture	**Topics**	**Mode of**	**Correspon ding CO**	**Mode of Assessing CO**

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		Delivery		
1	Aircraft characteristics aircraft performance characteristics, airport planning and air travel demand forecasting.	Lecture	CIV 802.1	Mid Term-1, Quiz & End Sem Exam
2	Aircraft characteristics aircraft performance characteristics airport planning and air travel demand forecasting.	Lecture	CIV 802.1	Mid Term-1, Quiz & End Sem Exam
3	Aircraft characteristics aircraft performance characteristics airport planning and air travel demand forecasting.	Lecture	CIV 802.1	Mid Term-1, Quiz & End Sem Exam
4	Aircraft characteristics aircraft performance characteristics airport planning and air travel demand forecasting.	Lecture	CIV 802.1	Mid Term-1, Quiz & End Sem Exam
5	Aircraft characteristics aircraft performance characteristics airport planning and air travel demand forecasting.	Lecture	CIV 802.1	Mid Term-1, Quiz & End Sem Exam
6	Aircraft characteristics airport planning and air travel demand forecasting.	Lecture	CIV 802.1	Mid Term-1, Quiz & End Sem Exam
7	Aircraft characteristics airport planning and air travel demand forecasting.	Lecture	CIV 802.1	Mid Term-1, Quiz & End Sem Exam
8	Aircraft characteristics airport planning and air travel demand forecasting.	Lecture	CIV 802.1	Mid Term-1, Quiz & End Sem Exam
9	Airport site selection, geometric design of the airfield, determination of runway capacity and delay, taxiway and gate capacity, holding aprons, terminal aprons, airport drainage.	Lecture	CIV 802.1	Mid Term-1, Quiz & End Sem Exam
10	*Airport site selection, geometric design of the airfield, determination of runway capacity and delay, taxiway and gate capacity, holding aprons, terminal aprons, airport drainage.*	Lecture	CIV 802.1	Mid Term-1, Quiz & End Sem Exam
11	*Airport site selection, geometric design of the airfield, determination of runway capacity and*	Lecture	CIV 802.1	Mid Term-1, Quiz & End Sem Exam

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	delay, taxiway and gate capacity, holding aprons, terminal aprons, airport drainage.			
12	*Airport site selection, geometric design of the airfield, determination of runway capacity and delay, taxiway and gate capacity, holding aprons, terminal aprons, airport drainage.*	Lecture	CIV 802.1	Mid Term-1, Quiz & End Sem Exam
13	*Airport site selection, geometric design of the airfield, determination of runway capacity and delay, taxiway and gate capacity, holding aprons, terminal aprons, airport drainage.*	Lecture	CIV 802.2	Mid Term-1, Quiz & End Sem Exam
14	*Airport site selection, geometric design of the airfield, determination of runway capacity and delay, taxiway and gate capacity, holding aprons, terminal aprons, airport drainage.*	Lecture	CIV 802.2	Mid Term-1, Quiz & End Sem Exam
15	*Airport site selection, geometric design of the airfield, determination of runway capacity and delay, taxiway and gate capacity, holding aprons, terminal aprons, airport drainage.*	Lecture	CIV 802.2	Mid Term-1, Quiz & End Sem Exam
16	*Airport site selection, geometric design of the airfield, determination of runway capacity and delay, taxiway and gate capacity, holding aprons, terminal aprons, airport drainage.*	Lecture	CIV 802.2	Mid Term-1, Quiz & End Sem Exam
17	*Airport site selection, geometric design of the airfield, determination of runway capacity and delay, taxiway and gate capacity, holding aprons, terminal aprons, airport drainage.*	Lecture	CIV 802.2	Mid Term-1, Quiz & End Sem Exam
18	*Airport site selection, geometric design of the airfield, determination of runway capacity and delay, taxiway and gate capacity, holding aprons, terminal*	Lecture	CIV 802.2	Mid Term-1, Quiz & End Sem Exam

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	aprons, airport drainage.			
19	*Airport site selection, geometric design of the airfield, determination of runway capacity and delay, taxiway and gate capacity, holding aprons, terminal aprons, airport drainage.*	Lecture	CIV 802.2	Mid Term-1, Quiz & End Sem Exam
20	*Airport site selection, geometric design of the airfield, determination of runway capacity and delay, taxiway and gate capacity, holding aprons, terminal aprons, airport drainage.*	Lecture	CIV 802.2	Mid Term-1, Quiz & End Sem Exam
21	Function of Airport Passenger and Cargo Terminal - Design of Air Freight Terminals, Airport access - Airport Landside planning – Capacity.	Lecture	CIV 802.2	Assignment, Quiz & End Sem Exam
22	Function of Airport Passenger and Cargo Terminal - Design of Air Freight Terminals, Airport access - Airport Landside planning – Capacity.	Lecture	CIV 802.2	Assignment, Quiz & End Sem Exam
23	Function of Airport Passenger and Cargo Terminal - Design of Air Freight Terminals, Airport access - Airport Landside planning – Capacity.	Lecture	CIV 802.2	Assignment, Quiz & End Sem Exam
24	Function of Airport Passenger and Cargo Terminal Design of Air Freight Terminals, Airport access - Airport Landside planning – Capacity.	Lecture	CIV 802.2	Assignment, Quiz & End Sem Exam
25	Function of Airport Passenger and Cargo Terminal Design of Air Freight Terminals, Airport access - Airport Landside planning – Capacity.	Lecture	CIV 802.3	Assignment, Quiz & End Sem Exam
26	Function of Airport Passenger and Cargo Terminal Design of Air Freight Terminals, Airport access - Airport Landside planning – Capacity.	Lecture	CIV 802.3	Assignment, Quiz & End Sem Exam
27	Function of Airport Passenger and Cargo Terminal Design of Air Freight Terminals, Airport access	Lecture	CIV 802.3	Assignment, Quiz & End Sem Exam

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	- Airport Landside planning – Capacity.			
28	Air Traffic Managementnavigational aids, ground based systems, satellite based systems.	Lecture	CIV 802.3	Assignment, Quiz & End Sem Exam
29	Air Traffic Managementnavigational aids, ground based systems, satellite based systems.	Lecture	CIV 802.3	Assignment, Quiz & End Sem Exam
30	Air Traffic Managementnavigational aids, ground based systems, satellite based systems.	Lecture	CIV 802.3	Assignment, Quiz & End Sem Exam
31	Air Traffic Managementnavigational aids, ground based systems, satellite based systems.	Lecture	CIV 802.3	Assignment, Quiz & End Sem Exam
32	Air traffic control and surveillance facilities, airfield lighting, air traffic management.	Lecture	CIV 802.3	Assignment, Quiz & End Sem Exam
33	Air traffic control and surveillance facilities, airfield lighting, air traffic management.	Lecture	CIV 802.3	Assignment, Quiz & End Sem Exam
34	Air traffic control and surveillance facilities, airfield lighting, air traffic management.	Lecture	CIV 802.3	Assignment, Quiz & End Sem Exam
35	Air traffic control and surveillance facilities, airfield lighting, air traffic management.	Lecture	CIV 802.3	Assignment, Quiz & End Sem Exam
36	Air traffic control and surveillance facilities, airfield lighting, air traffic management.	Lecture	CIV 802.3	Assignment, Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO11	PO11	PO1	PSO	PSO	PSO

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											0	1	2	1	2	3
CIV 802.1	Design and analyze airports.	3	3	1	3	1				2		2	1			
CIV 802.2	Understand the skills to solve problems dealing with different airport design problems.	3	2	2	2	2				2		1	1			
CIV 802.3	Identify the alignment and length of airport runway and draw an airport layout.	3	2	2	2	2				2		1	1			

Amity University Madhya Pradesh
B.Tech (Civil Engineering)
2020-2024
Exam Result For (Semester) : VIII
Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment. No.	Student's Name	CIV802 AIRPORT PLANNING AND DESIGN							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U2G2
1	A602158200001	Mr ABHI PRATAP	100	30	70	A-	8	3	3	24
2	A602158200003	Mr SHYAM VEER SINGH	100	30	70	A+	10	3	3	30
3	A602158200004	Mr SAHIL SHARMA	100	30	70	A	9	3	3	27
4	A602158200002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	A	9	3	3	27
			Total No. of Students			=	4			

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Total No. of Students	>60 % marks	4	100.00	%
Attainment Level			Level 3	

DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : FOUNDATION ENGINEERING
Course Code : CIV 803, Crédits : 03, Session : 2023-24 (Even Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Imran Ahmad Khan

A. Introduction

This course aims at providing students with a background on principles of foundation design. Students will be exposed to the theories and concepts of foundation design. Skills will be gained and learned through problem sets and a comprehensive design projects.

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

- **CIV 803.1**.Learn about types and purposes of different foundation systems and structures.
- **CIV 803.2**.Have an exposure to the systematic methods for designing foundations.

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- **CIV 803.3.** Be able evaluate the feasibility of foundation solutions to different types of soil conditions considering the time effect on soil behaviour.
- **CIV 803.4.** Have necessary theoretical background for design and construction of foundation systems.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

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PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. 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.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

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 isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			100%

E. Course Content

Module I: Introduction to Different Types of Foundation: Analysis and design of

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foundations, types of foundations. Different types of foundation suitable for structures based on soil type and design requirements.

Module II: Settlement of Foundation: Bearing capacity and settlement of foundations; ground movements due to construction. Soil properties for foundation design. Soil improvement requirement theory discussion.

Module III: Design of Excavation: Analysis and design of excavations, retaining walls, cuts & excavations.

Module IV: Underground Structures: Sheet piles, slopes and underground structures. Design and analysis.

Module V: Pile Foundations: Design of strap footings, isolated footing, pile foundations etc. Theory of design of foundations.

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; Att: Attendance

G. Suggested Books

- Singh, Modern Geotechnical Engineering, 3rd Ed., CBS Publishers, New Delhi, 1999.
- B.M. Das, Principles of Foundation Engineering, 5th Ed., Thomson Asia, Singapore, 2003.
- N. Som, Theory and Practice of Foundation Design, Prentice Hall, New Delhi, 2003.

H. Lecture Plan

Lecture	**Topics**	**Mode of Delivery**	**Corresponding CO**	**Mode of Assessing CO**
1	Analysis and design of foundations, types of foundations. Different types of foundation suitable for structures based on soil type and design requirements.	Lecture	CIV 803.1	Mid Term-1, Quiz & End Sem Exam
2	Analysis and design of foundations, types of foundations. Different types of foundation suitable for structures based on soil type and design requirements.	Lecture	CIV 803.1	Mid Term-1, Quiz & End Sem Exam
3	Analysis and design of	Lecture	CIV 803.1	Mid Term-1, Quiz

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	foundations, types of foundations. Different types of foundation suitable for structures based on soil type and design requirements.			& End Sem Exam
4	Analysis and design of foundations, types of foundations. Different types of foundation suitable for structures based on soil type and design requirements.	Lecture	CIV 803.1	Mid Term-1, Quiz & End Sem Exam
5	Analysis and design of foundations, types of foundations. Different types of foundation suitable for structures based on soil type and design requirements.	Lecture	CIV 803.1	Mid Term-1, Quiz & End Sem Exam
6	Analysis and design of foundations, types of foundations. Different types of foundation suitable for structures based on soil type and design requirements.	Lecture	CIV 803.1	Mid Term-1, Quiz & End Sem Exam
7	Analysis and design of foundations, types of foundations. Different types of foundation suitable for structures based on soil type and design requirements.	Lecture	CIV 803.1	Mid Term-1, Quiz & End Sem Exam
8	*Bearing capacity and settlement of foundations; ground movements due to construction. Soil properties for foundation design. Soil improvement requirement theorydiscussion.*	Lecture	CIV 803.1	Mid Term-1, Quiz & End Sem Exam
9	*Bearing capacity and settlement of foundations; ground movements due to construction. Soil properties for foundation*	Lecture	CIV 803.1	Mid Term-1, Quiz & End Sem Exam

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	design. Soil improvement requirement theorydiscussion.			
10	Bearing capacity and settlement of foundations; ground movements due to construction. Soil properties for foundation design. Soil improvement requirement theory discussion.	Lecture	CIV 803.2	Mid Term-1, Quiz & End Sem Exam
11	Bearing capacity and settlement of foundations; ground movements due to construction. Soil properties for foundation design. Soil improvement requirement theory discussion.	Lecture	CIV 803.2	Mid Term-1, Quiz & End Sem Exam
12	Bearing capacity and settlement of foundations; ground movements due to construction. Soil properties for foundation design. Soil improvement requirement theory discussion.	Lecture	CIV 803.2	Mid Term-1, Quiz & End Sem Exam
13	Bearing capacity and settlement of foundations; ground movements due to construction. Soil properties for foundation design. Soil improvement requirement theory discussion.	Lecture	CIV 803.2	Mid Term-1, Quiz & End Sem Exam
14	Bearing capacity and settlement of foundations; ground movements due to construction. Soil properties for foundation design. Soil improvement requirement theory discussion.	Lecture	CIV 803.2	Mid Term-1, Quiz & End Sem Exam
15	Analysis and design of excavations, retaining walls, cuts & excavations.	Lecture	CIV 803.2	Mid Term-1, Quiz & End Sem Exam

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16	Analysis and design of excavations retaining walls, cuts & excavations.	Lecture	CIV 803.2	Mid Term-1, Quiz & End Sem Exam
17	Analysis and design of excavations retaining walls, cuts & excavations.	Lecture	CIV 803.2	Mid Term-1, Quiz & End Sem Exam
18	Analysis and design of excavations retaining walls, cuts & excavations	Lecture	CIV 803.2	Mid Term-1, Quiz & End Sem Exam
19	Analysis and design of excavations retaining walls, cuts & excavations	Lecture	CIV 803.3	Mid Term-1, Quiz & End Sem Exam
20	Analysis and design of excavations retaining walls, cuts & excavations	Lecture	CIV 803.3	Mid Term-1, Quiz & End Sem Exam
21	*Analysis and design of excavationsretaining walls, cuts & excavations*	Lecture	CIV 803.3	Assignment, Quiz & End Sem Exam
22	Sheet piles, slopes and underground structures. Design and analysis. Design of strap footings, isolated footing, pile foundations etc. Theory of design of foundations.	Lecture	CIV 803.3	Assignment, Quiz & End Sem Exam
23	Sheet piles, slopes and underground structures. Design and analysis.	Lecture	CIV 803.3	Assignment, Quiz & End Sem Exam
24	Sheet piles, slopes and underground structures. Design and analysis.	Lecture	CIV 803.3	Assignment, Quiz & End Sem Exam
25	Sheet piles, slopes and underground structures. Design and analysis.	Lecture	CIV 803.3	Assignment, Quiz & End Sem Exam
26	Sheet piles, slopes and underground structures. Design and analysis.	Lecture	CIV 803.3	Assignment, Quiz & End Sem Exam
27	Sheet piles, slopes and underground structures. Design and analysis.	Lecture	CIV 803.3	Assignment, Quiz & End Sem Exam
28	Sheet piles, slopes and	Lecture	CIV 803.4	Assignment, Quiz

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	underground structures. Design and analysis.			& End Sem Exam
29	Sheet piles, slopes and underground structures. Design and analysis.	Lecture	CIV 803.4	Assignment, Quiz & End Sem Exam
30	Design of strap footings, isolated footing, pile foundations etc. Theory of design of foundations.	Lecture	CIV 803.4	Assignment, Quiz & End Sem Exam
31	Design of strap footings, isolated footing, pile foundations etc. Theory of design of foundations.	Lecture	CIV 803.4	Assignment, Quiz & End Sem Exam
32	Design of strap footings, isolated footing, pile foundations etc. Theory of design of foundations.	Lecture	CIV 803.4	Assignment, Quiz & End Sem Exam
33	Design of strap footings, isolated footing, pile foundations etc. Theory of design of foundations.	Lecture	CIV 803.4	Assignment, Quiz & End Sem Exam
34	Design of strap footings, isolated footing, pile foundations etc. Theory of design of foundations.	Lecture	CIV 803.4	Assignment, Quiz & End Sem Exam
35	Design of strap footings, isolated footing, pile foundations etc. Theory of design of foundations.	Lecture	CIV 803.4	Assignment, Quiz & End Sem Exam
36	Design of strap footings, isolated footing, pile foundations etc. Theory of design of foundations.	Lecture	CIV 803.4	Assignment, 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	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PS	PS	PS

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		1	2	3	4	5	6	7	8	9	10	11	12	O1	O2	O3
CIV 803.1	Learn about types and purposes of different foundation systems and structures.	3	3	1	3	1				2		2	1			
CIV 803.2	Have an exposure to the systematic methods for designing foundations.	3	2	2	2	2				2		1	1			
CIV 803.3	Be able evaluate the feasibility of foundation solutions to different types of soil conditions considering the time effect on soil behaviour.	3	3	1	3	1				2		2	1			
CIV 803.4	Have necessary theoretical background for design and construction of foundation systems.	3	3	1	3	1				2		2	1			

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Amity University Madhya Pradesh
B.Tech (Civil Engineering)
2020-2024
Exam Result For (Semester) : VIII
Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment. No.	Student's Name	CIV803 FOUNDATION ENGINEERING							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U4G4
1	A602158200001	Mr ABHI PRATAP	100	30	70	B-	5	3	3	15
2	A602158200003	Mr SHYAM VEER SINGH	100	30	70	A+	10	3	3	30
3	A602158200004	Mr SAHIL SHARMA	100	30	70	A	9	3	3	27
4	A602158200002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	B+	7	3	3	21
			Total No. of Students			=	4			
			Total No. of Students			>60 % marks	2	50.00	%	
			Attainment Level					-		

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DEPARTMENT OF CIVIL ENGINEERING
Course Handout
Course : Foundation Engineering Lab
Course Code : CIV 823, Crédits : 01, Session : 2023-24 (Even Sem.), Class : B.Tech. 4th Year
Faculty Name : Dr. Imran Ahmad Khan

A. Introduction

This course aims at providing students with a background on principles of foundation design. Students will be exposed to the theories and concepts of foundation design. Skills will be gained and learned through problem sets and a comprehensive design projects.

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

- **CIV 823.1**.Learn about types and purposes of different foundation systems and structures. Have an exposure to the systematic methods for designing foundations.
- **CIV 823.2**.Be able evaluate the feasibility of foundation solutions to different types of soil conditions considering the time effect on soil behaviour. Have necessary theoretical background for design and construction of foundation systems.

C. Programme Outcomes:

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PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

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PO11. 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.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

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 isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			100%

E. Course Content

- Drawing different elements of isolated footing. **(2 Hours)**
- Drawing different elements of strap footing. **(2 Hours)**
- Drawing different elements of pile foundation. **(2 Hours)**
- Drawing different elements of retaining walls. **(2 Hours)**
- Drawing different elements of sheet piles. **(2 Hours)**
- Drawing different elements of grouting for soil stabilization. **(2 Hours)**

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- Drawing different elements of well foundation. **(2 Hours)**
- Drawing different elements of seepage (flow lines, equipotential lines) under water dams. **(2 Hours)**
- Drawing different elements of negative skin friction location on pile foundations. **(2 Hours)**
- Identification of earth quake zones. Show different earth quake zones in India. **(2 Hours)**

F. Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	**10**	**10**	**5**	**35**	**35**

Note: IA –Internal Assessment, EE- External Exam, PR- Performance, LR – Lab Record, V – Viva. V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- Singh, Modern Geotechnical Engineering, 3rd Ed., CBS Publishers, New Delhi, 1999.
- B.M. Das, Principles of Foundation Engineering, 5th Ed., Thomson Asia, Singapore, 2003.
- N. Som, Theory and Practice of Foundation Design, Prentice Hall, New Delhi, 2003.

G. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Drawing different elements of isolated footing.	Practical	CIV 823.1	Mid Term-1, Quiz & End Sem Exam
2	Drawing different elements of strap footing.	Practical	CIV 823.1	Mid Term-1, Quiz & End Sem Exam
3	Drawing different elements of pile foundation.	Practical	CIV 823.1	Mid Term-1, Quiz & End Sem Exam
4	Drawing different elements of retaining walls.	Practical	CIV 823.1	Mid Term-1, Quiz & End Sem Exam
5	Drawing different elements of sheet piles.	Practical	CIV 823.1	Mid Term-1, Quiz & End Sem Exam
6	Drawing different elements of grouting for soil stabilization.	Practical	CIV 823.1	Mid Term-1, Quiz & End Sem Exam
7	Drawing different elements of well foundation.	Practical	CIV 823.2	Mid Term-1, Quiz & End Sem Exam
8	Drawing different elements of seepage (flow lines, equipotential lines) under water dams.	Practical	CIV 823.2	Mid Term-1, Quiz & End Sem Exam
9	Drawing different elements of negative skin friction location on	Practical	CIV 823.2	Mid Term-1, Quiz & End Sem Exam

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	pile foundations.			
10	Identification of earth quake zones. Show different earth quake zones in India.	Practical	CIV 823.2	Mid Term-1, Quiz & End Sem Exam
11	Identification of earth quake zones. Show different earth quake zones in India.	Practical	CIV 823.2	Mid Term-1, Quiz & End Sem Exam
12	Identification of earth quake zones. Show different earth quake zones in India.	Practical	CIV 823.2	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		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CIV 823.1	Learn about types and purposes of different foundation systems and structures. Have an exposure to the systematic methods for designing foundations. systems.	3	3	1	3	1				2		2	1			
CIV 823.2	Be able evaluate the feasibility of foundation solutions to different types of soil conditions considering the time effect on soil behaviour. Have necessary theoretical background for design and	3	2	2	2	2				2		1	1			

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	construction of foundation.															

Amity University Madhya Pradesh

B.Tech (Civil Engineering)

2020-2024

Exam Result For (Semester) : VIII

Institute : Amity School of Engineering and Technology, Gwalior

S. No.	Enrollment. No.	Student's Name	CIV823 FOUNDATION ENGINEERING LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U5G5
1	A602158200001	Mr ABHI PRATAP	100	30	70	A+	10	1	1	10
2	A602158200003	Mr SHYAM VEER SINGH	100	30	70	A+	10	1	1	10
3	A602158200004	Mr SAHIL SHARMA	100	30	70	A+	10	1	1	10
4	A602158200002	Mr AMRENDRA SINGH CHAUHAN	100	30	70	A+	10	1	1	10
			Total No. of Students			=	4			
			Total No. of Students			>60% marks	4	100.00	%	
			Attainment Level					Level 3		

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AMITY UNIVERSITY

MADHYA PRADESH

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

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : PROBLEM SOLVING TECHNIQUES
Course Code : CSE 604, Crédits : 03, Session :2023-24(Even Sem.), Class : B.Tech. 3RD Year
Faculty Name : Dr. Madhavi Dhingra

A. **Introduction:** The objective of this course is to improve problem solving skills using the concept of C,C++ and data structures and develop knowledge of basic data structures for storage and retrieval of ordered or unordered data. Data structures include: arrays, linked lists, binary trees, heaps, and hash tables etc.

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

CSE604.1. Understand the concepts of data structure, data types and array data structure.

CSE604.2. Implement linked list data structure to solve various problems.

CSE604.3. Apply concepts and techniques of object oriented programming.

CSE604.4.Apply various data structure such as stacks, queues, trees and graphs to solve various computing problems using programming language.

CSE604.5. Analyze various tree and graph based techniques to solve problems.

C. Program Outcomes:

[PO1].Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

[**PO2]. Problem Analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

[**PO3]. Design/Development of Solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

[**PO4]. Conduct Investigations of Complex Problems**:Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

[**PO5]. Modern Tool Usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

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[**PO6]. The Engineer and Society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

[**PO7]. Environment and Sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

[**PO8]. Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

[**PO9]. Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

[**PO10]. Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

[**PO11]. 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.

[**PO12]. Project Management and Finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Program Specific Outcomes:

PSO1. Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.
PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.
PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

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	10%

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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 allowanceof 25% includes all types of leaves Including medical leaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F.

F. Syllabus

Module I: Programming in C –I: (04 Hours) Introduction: Basic structure of C program, Concept of variables, constants and data types in C, Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity. Managing Input and output Operation, formatting I/O. **Control Structures and Looping:** C Statements, conditional executing using if, else, nesting of if, switch and break Concepts of loops, example of loops in C using for, while and do-while, continue and break. Storage types (automatic, register etc.), predefined processor, Command Line Argument.

Module II: Programming in C – II: (06 Hours) Arrays and Functions: One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations. Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function, function argument, function with variable number of argument, recursion. **Pointers:** Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments. **String:** Strings and C string library. **Structure:** Structure and Union, Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments. **File Handling:** Basics of file Handling.

Module III: Object Oriented Programming in C++: (05 Hours) Difference between C and C++, Procedure Oriented and Object Oriented Approach, Characteristics of Object-Oriented Languages **Classes and Objects:** Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator, Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators. **Inheritance:** Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class, Aggregation, composition vs classification hiérarchies, Overriding inheritance methods, Constructors in derived classes, Nesting of Classes. **Polymorphism:** Polymorphism, Type of Polymorphism – Compile time and runtime, Function Overloading, Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.

Module IV: Data Structure –I: (07 Hours) Classification of Data structures, Abstract Data Types, Implementation aspects: Memory representation. Data structures operations and its cost estimation. **Linked List:** Representation of linked list in memory, different implementation of linked list. Circular linked list, doubly linked list, etc. Application of linked list: polynomial manipulation using linked list, etc. **Stacks:** Stacks as ADT, Different implementation of stack, multiple stacks. Application of Stack: Conversion of infix to postfix notation using stack, evaluation of postfix expression, Recursion. **Queues:** Queues as ADT, Different implementation of queue, Circular queue, Concept of Dqueue and Priority Queue, Applic[illegible] of queues

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Module V: Data Structure-II: (08 Hours) Tree: Definitions - Height, depth, order, degree etc. Binary Search Tree - Operations, Traversal, Search. AVL Tree, Heap, Applications and comparison of various types of tree; Introduction to forest, multi-way Tree, B tree, B+ tree, B* tree and red-black tree. **Graphs:** Introduction, Classification of graph: Directed and Undirected graphs, etc, Representation, Graph Traversal: Depth First Search (DFS), Breadth First Search (BFS), Graph algorithm: Minimum Spanning Tree (MST)- Kruskal, Prim's algorithms. Dijkstra's shortest path algorithm; Comparison between different graph algorithms. Application of graphs. **Sorting:** Introduction, Sort methods like: Bubble Sort, Quick sort. Selection sort, Heap sort, Insertion sort, Shell sort, Merge sort and Radix sort; comparison of various sorting techniques. Basic Search Techniques: Sequential search, Binary search, Comparison of search methods, Hashing & Indexing.

G. Examination Scheme:

Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

H.
H.

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

H. Suggested Text/Reference Books:

- Yashwant Kanetkar, "Let us C", BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, "C: The complete reference", Osbourne Mcgraw Hill, 4th Edition, 2002.
- A.R. Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
- R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
- A. M. Tenenbaum, "Data Structures using C & C++", Prentice-Hall of India Pvt. Ltd., New Delhi.
- Kernighan & Ritchie, "C Programming Language", The (Ansi C Version), PHI, 2nd Edition.
- "Object Oriented Programming with C++" By E. Balagurusamy.
- Bruno R Preiss, "Data Structures and Algorithms with Object Oriented Design Pattern in C++", Jhon Wiley & Sons, Inc.
- Gilberg Forozan , "Data Structure – A pseudo code approach with C++", Cengage Learning, New Delhi

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Basic structure of C program, Concept of variables, constants and data types in C	Lecture	CSE604.1	Mid Term-1, Quiz & End Sem Exam

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2	Operators and expressions: Introduction, arithmetic, relational, Logical, Assignment, Increment and decrement operator, Conditional, bitwise operators, Expressions, Operator precedence and associativity.	Lecture	CSE604.1	Mid Term-1, Quiz & End Sem Exam
3	Managing Input and output Operation, formatting I/O	Lecture	CSE604.1	Mid Term-1, Quiz & End Sem Exam
4	Control Structures and Looping: C Statements, conditional executing using if, else, nesting of if, switch and break	Lecture	CSE604.1	Mid Term-1, Quiz & End Sem Exam
5	Concepts of loops, example of loops in C using for, while and do-while, continue and break.	Lecture	CSE604.1	Mid Term-1, Quiz & End Sem Exam
6	Storage types (automatic, register etc.), predefined processor, Command Line Argument.	Lecture	CSE604.1	Mid Term-1, Quiz & End Sem Exam
7	Arrays and Functions: One dimensional arrays and example of iterative programs using arrays, 2-D arrays Use in matrix computations.	Lecture	CSE604.2	Mid Term-1, Quiz & End Sem Exam
8	Concept of Sub-programming, functions Example of user defined functions. Function prototype, Return values and their types, calling function	Lecture	CSE604.2	Mid Term-1, Quiz & End Sem Exam
9	function argument, function with variable number of argument, recursion.	Lecture	CSE604.2	Mid Term-1, Quiz & End Sem Exam
10	Pointers: Pointers, relationship between arrays and pointers Argument passing using pointers,	Lecture	CSE604.2	Mid Term-1, Quiz & End Sem Exam
11	Array of pointers. Passing arrays as arguments.	Lecture	CSE604.2	Mid Term-1, Quiz & End Sem Exam
12	String: Strings and C string library.	Lecture	CSE604.2	Mid Term-1, Quiz & End Sem Exam

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13	Structure: Structure and Union, Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments.	Lecture	CSE604.2	Mid Term-1, Quiz & End Sem Exam
14	File Handling: Basics of file Handling.	Lecture	CSE604.3	Mid Term-1, Quiz & End Sem Exam
15	Difference between C and C++, Procedure Oriented and Object Oriented Approach, Characteristics of Object-Oriented Languages Classes and Objects: Abstract data types, Object & classes, attributes, methods, C++ class declaration, Local Class and Global Class, State identity and behaviour of an object, Local Object and Global Object, Scope resolution operator	Lecture	CSE604.3	Mid Term-1, Quiz & End Sem Exam
16	Friend Functions, Inline functions, Constructors and destructors, instantiation of objects, Types of Constructors, Static Class Data, Array of Objects, Constant member functions and Objects, Memory management Operators.	Lecture	CSE604.3	Mid Term-1, Quiz & End Sem Exam
17	Inheritance: Inheritance, Types of Inheritance, access modes – public, private & protected, Abstract Classes, Ambiguity resolution using scope resolution operator and Virtual base class	Lecture	CSE604.3	Mid Term-1, Quiz & End Sem Exam
18	Aggregation, composition vs classification hiérarchies, Overriding inheritance methods	Lecture	CSE604.3	Mid Term-1, Quiz & End Sem Exam
19	Constructors in derived classes, Nesting of Classes.	Lecture	CSE604.3	Mid Term-1, Quiz & End Sem Exam
20	Polymorphism: Polymorphism, Type of Polymorphism – Compile time and	Lecture	CSE604.3	Mid Term-1, Quiz & End

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				Sem Exam
21	Operator Overloading (Unary and Binary) Polymorphism by parameter, Pointer to objects, this pointer, Virtual Functions, pure virtual functions.	Lecture	CSE604.3	Mid Term-2, Quiz & End Sem Exam
22	Classification of Data structures, Abstract Data Types, Implementation aspects: Memory representation. Data structures operations and its cost estimation.	Lecture	CSE604.4	Mid Term-2, Quiz & End Sem Exam
23	**Linked List:** Representation of linked list in memory, different implementation of linked list. Circular linked list, doubly linked list, etc. Application of linked list: polynomial manipulation using linked list, etc.	Lecture	CSE604.4	Mid Term-2, Quiz & End Sem Exam
24	**Stacks:** Stacks as ADT, Different implementation of stack, multiple stacks.	Lecture	CSE604.4	Mid Term-2, Quiz & End Sem Exam
25	Application of Stack: Conversion of infix to postfix notation using stack, evaluation of postfix expression, Recursion.	Lecture	CSE604.4	Mid Term-2, Quiz & End Sem Exam
26	**Queues:** Queues as ADT, Different implementation of queue, Circular queue, Concept of Dqueue and Priority Queue, Application of queues.	Lecture	CSE604.4	Mid Term-2, Quiz & End Sem Exam
27	**Tree:** Definitions - Height, depth, order, degree etc. Binary Search Tree - Operations	Lecture	CSE604.4	Mid Term-2, Quiz & End Sem Exam
28	Traversal, Search. AVL Tree, Heap, Applications and comparison of various types of tree;	Lecture	CSE604.5	Mid Term-2, Quiz & End Sem Exam
29	Introduction to forest, multi-way Tree, B tree, B+ tree, B* tree and red-black tree.	Lecture	CSE604.5	Mid Term-2, Quiz & End Sem Exam
30	**Graphs:** Introduction, Classification of graph: Directed and Undirected graphs, etc	Lecture	CSE604.5	Mid Term-2, Quiz & End Sem Exam

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31	Representation, Graph Traversal: Depth First Search (DFS), Breadth First Search (BFS)	Lecture	CSE604.5	Mid Term-2, Quiz & End Sem Exam
32	Graph algorithm: Minimum Spanning Tree (MST)- Kruskal, Prim's algorithms.	Lecture	CSE604.5	Mid Term-2, Quiz & End Sem Exam
33	Dijkstra's shortest path algorithm; Comparison between different graph algorithms. Application of graphs.	Lecture	CSE604.5	Mid Term-2, Quiz & End Sem Exam
34	**Sorting:** Introduction, Sort methods like: Bubble Sort, Quick sort. Selection sort, Heap sort, Insertion sort, Shell sort, Merge sort and Radix sort	Lecture	CSE604.5	Mid Term-2, Quiz & End Sem Exam
35	Comparison of various sorting techniques. Basic Search Techniques: Sequential search, Binary search,	Lecture	CSE604.5	Mid Term-2, Quiz & End Sem Exam
36	Comparison of search methods, Hashing & Indexing.	Lecture	CSE604.5	Mid Term-2, Quiz & End Sem Exam

J.

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME-SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

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CSE323.1	Understand the concepts of data structure, data types and standard array data																

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	astructure.															
CSE323.2	Implementlinkedlistdatastructuretosolvevariou	3	2	1										1		

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	s p r o b l e m s .															
C S E 3 2 3 . 3	Apply concepts and techniques of object oriented programming.	2														
C S E 3 2 3 . 4	Apply various data structure such as stacks, queues, trees and graphs to solve	2														

	various computing problems using programming language.															
CSE323.5	Analyze various tree and graph based techniques to solve problems.	3												1		

ATTAINMENT

ESE Marks – CSE 604, PROBLEM SOLVING TECHNIQUES

S. No.			CSE604							
			PROBLEM SOLVING TECHNIQUES							
			Max Marks	CE Weight Age	ET Weight Age	GO		AC	EC	U4G
	Enrollme									

1	A60205221001	Mr MARAMREDDY ASHISH KUMAR REDDY	100	30	70	A-	8	3	3	24
2	A60205221002	Mr VEDANT GUPTA	100	30	70	B	6	3	3	18
3	A60205221009	Mr PRANSHUL SHARMA	100	30	70	A	9	3	3	27
4	A60205221020	Mr HARSH RAJ SINGH CHAUHAN	100	30	70	A	9	3	3	27
5	A60205221013	Ms PEARL BANSAL	100	30	70	A-	8	3	3	24
6	A60205221010	Mr VANSH GUPTA	100	30	70	B-	5	3	3	15
7	A60205221005	Mr ANURAG SINGH RANA	100	30	70	B+	7	3	3	21
8	A60205221012	Mr ROHIT SHARMA	100	30	70	A-	8	3	3	24
9	A60205221003	Mr SANJAY KUSHWAH	100	30	70	B	6	3	3	18
10	A60205221004	Mr VISHAL KU-MAR	100	30	70	B+	7	3	3	21
11	A60205221016	Mr HARSHIT SHARMA	100	30	70	B+	7	3	3	21
12	A60205221035	Mr BIKASH NATH	100	30	70	B+	7	3	3	21
13	A60205221023	Mr VIVEK YADAV	100	30	70	B	6	3	3	18
14	A60205221031	Ms MANYATA SINGH	100	30	70	A-	8	3	3	24
15	A60205221011	Ms ANDREA NAR-CIS	100	30	70	B+	7	3	3	21

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16	A60205221018	Mr SAHIL KHAN	100	30	70	B-	5	3	3	15
17	A60205221007	Mr SUYASH DESHMUKH	100	30	70	A-	8	3	3	24
18	A60205221022	Mr SANSKAR SONI	100	30	70	B+	7	3	3	21
19	A60205221021	Mr DHARMENDRA DIWAKAR	100	30	70	DE	0	3	0	0
20	A60205221041	Mr ARYAN SINGH TOMAR	100	30	70	B	6	3	3	18
21	A60205221025	Mr YASH SHARMA	100	30	70	B	6	3	3	18
22	A60205221033	Mr SANDEEP SHARMA	100	30	70	B+	7	3	3	21
23	A60205221039	Ms MUSKAN BANSAL	100	30	70	B	6	3	3	18
24	A60205221024	Ms MEGHNA GUPTA	100	30	70	A-	8	3	3	24
25	A60205221046	Mr YASIR KHAN	100	30	70	A-	8	3	3	24
26	A60205221029	Mr PRIYANSHU KUMAR	100	30	70	B+	7	3	3	21
27	A60205221034	Mr TARUN SINGH TOMAR	100	30	70	B-	5	3	3	15
28	A60205221052	Mr ABHINAV KU-MAR	100	30	70	F	0	3	0	0
29	A60205221026	Ms PRAGYA GUPTA	100	30	70	A-	8	3	3	24
30	A60205221071	Ms SWATI GUPTA	100	30	70	A-	8	3	3	24
31	A60205221051	Mr VIPUL KUMAR	100	30	70	A	8	3	3	27

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32	A60205221027	Ms SIMRAN SINGH	100	30	70	A-	8	3	3	24
33	A60205221057	Mr MIRIYAM HE-MANTH KUMAR	100	30	70	A	9	3	3	27
34	A60205221047	Mr ANUSH M K	100	30	70	A	9	3	3	27
35	A60205221036	Ms KARTIKA CHAUHAN	100	30	70	A-	8	3	3	24
36	A60205221061	Mr DEEPENDRA SHARMA	100	30	70	B+	7	3	3	21
37	A60205221038	Ms VANDANA	100	30	70	B+	7	3	3	21
38	A60205221081	Mr DEVANSH VERMA	100	30	70	A	9	3	3	27
39	A60205221066	Mr HARSHAVARDHAN CHEVADA-BOINA	100	30	70	B	6	3	3	18
40	A60205221042	Ms KRATI GOYAL	100	30	70	B+	7	3	3	21
41	A60205221059	Mr AYUSH TOMAR	100	30	70	B	6	3	3	18
42	A60205221055	Mr SHIVAM SINGH TOMAR	100	30	70	A-	8	3	3	24
43	A60205221040	Mr SHOBHIT CHATURVEDI	100	30	70	A-	8	3	3	24
44	A60205221073	Mr UTKARSH BHADORIA	100	30	70	A-	8	3	3	24
45	A60205221054	Mr HIMANSHU SINGH	100	30	70	B+	7	3	3	21

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46	A60205221099	Mr MANAV PRATAP SINGH TOMAR	100	30	70	B	6	3	3	18
47	A60205221077	Mr BADAL KUSH-WAH	100	30	70	B	6	3	3	18
48	A60205221053	Mr AYUSH SHARMA	100	30	70	B	6	3	3	18
49	A60205221068	Ms SHRUTI AGARWAL	100	30	70	A	9	3	3	27
50	A60205221058	Mr AYUSH SHARMA	100	30	70	A-	8	3	3	24
51	A60205221062	Mr MAYANK BO-HARE	100	30	70	B+	7	3	3	21
52	A60205221076	Mr AKSHAT SHRIVASTAVA	100	30	70	B+	7	3	3	21
53	A60205221056	Mr MORUBOYINA VENKATA SAI AKHIL	100	30	70	B+	7	3	3	21
54	A60205221101	Mr ANUBHAV KHANDELWAL	100	30	70	A	9	3	3	27
55	A60205221091	Mr YUVRAJ SINGH PARIHAR	100	30	70	B	6	3	3	18
56	A60205221064	Ms NIKHAT FAT-IMA	100	30	70	A	9	3	3	27
57	A60205221080	Mr ABHISHEK SHARMA	100	30	70	B	6	3	3	18
58	A60205221069	Mr LOVE KUMAR	100	30	70	A-	8	3	3	24
59	A60205221074	Ms SHATAKSHI SHARMA	100	30	70	A-	8	3	3	24
60	A60205221088	Mr CHIRAG SISODIYA	100	30	70	DE	0	3	0	0

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61	A60205221063	Mr ADESH TIWARI	100	30	70	B-	5	3	3	15
62	A60205221111	Ms VAISHALI PATEL	100	30	70	A	9	3	3	27
63	A60205221098	Mr SUYASH PATHAK	100	30	70	F	0	3	0	0
64	A60205221079	Mr PRIYANSHU TANGAR	100	30	70	A-	8	3	3	24
65	A60205221082	Mr MOKSH TIWARI	100	30	70	A-	8	3	3	24
66	A60205221085	Mr HRISHI SHARMA	100	30	70	B+	7	3	3	21
67	A60205221075	Mr SHUBHAM GOYAL	100	30	70	B+	7	3	3	21
68	A60205221106	Mr ROHAN RAKSHIT	100	30	70	A-	8	3	3	24
69	A60205221065	Mr ABHISHEK SINGH	100	30	70	A-	8	3	3	24
70	A60205221131	Mr SHIVANK SINGH BHADAURIA	100	30	70	A-	8	3	3	24
71	A60205221126	Mr VISHNU SHARMA	100	30	70	F	0	3	0	0
72	A60205221083	Mr RAJ SHARMA	100	30	70	B	6	3	3	18
73	A60205221094	Ms PURVI GUPTA	100	30	70	A	9	3	3	27
74	A60205221095	Mr SURAJ SINGH TOMAR	100	30	70	A	9	3	3	27
75	A60205221087	Mr KONJETI MOHAN SAI AKHIL	100	30	70	B+	7	3	3	21

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76	A60205221109	Mr DODLA AJAY KUMAR	100	30	70	A-	8	3	3	24
77	A60205221078	Ms ISHU KUSHWAH	100	30	70	B-	5	3	3	15
78	A60205221137	Ms SNEHA GUPTA	100	30	70	B-	5	3	3	15
79	A60205221132	Mr KISHAN RATHORE	100	30	70	B+	7	3	3	21
80	A60205221089	Ms VANSHIKA SISODIYA	100	30	70	A	9	3	3	27
81	A60205221100	Mr ANMOL KUMAR	100	30	70	B+	7	3	3	21
82	A60205221105	Mr KARANVEER SINGH RAJAWAT	100	30	70	A	9	3	3	27
83	A60205221107	Mr ANURAG SINGH BHADORIA	100	30	70	A-	8	3	3	24
84	A60205221121	Mr JYOTIRADITYA KUMAR SHRIVASTAVA	100	30	70	B+	7	3	3	21
85	A60205221084	Mr DEVESH SHRIVAS	100	30	70	B-	5	3	3	15
86	A60205221147	Mr YASH KUMAR SAH	100	30	70	B	6	3	3	18
87	A60205221156	Mr RAJ SINGH RAJAWAT	100	30	70	B-	5	3	3	15
88	A60205221093	Mr RAHUL SINGH DHAKAD	100	30	70	B+	7	3	3	21
89	A60205221116	Mr ISHAAN DHINGRA	100	30	70	B+	7	3	3	21
90	A60205221133	Mr PRATIK KUMAR JHA	100	30	70	A-	8	3	3	24

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91	A60205221108	Ms VEDIKA YERUNKAR	100	30	70	B-	5	3	3	15
92	A60205221124	Mr ARYAN VYAS	100	30	70	B-	5	3	3	15
93	A60205221086	Mr SANDEEP YADAV	100	30	70	A-	8	3	3	24
94	A60205221162	Mr DEVANSH CHATURVEDI	100	30	70	F	0	3	0	0
95	A60205221167	Mr AASHI GUPTA	100	30	70	A	9	3	3	27
96	A60205221103	Ms SUCHI JAIN	100	30	70	A	9	3	3	27
97	A60205221129	Mr AJAY PARIHAR	100	30	70	B+	7	3	3	21
98	A60205221149	Mr DEVANSH DUBEY	100	30	70	B	6	3	3	18
99	A60205221112	Ms SMRUTI SRADHA JENA	100	30	70	A-	8	3	3	24
100	A60205221135	Mr HARSHVARDHAN SINGH TOMAR	100	30	70	A-	8	3	3	24
101	A60205221090	Mr SAKSHAM JAIN	100	30	70	A-	8	3	3	24
102	A60205221164	Mr SATISH KUMAR	100	30	70	B-	5	3	3	15
103	A60205221173	Ms VAISHNAVI	100	30	70	A	9	3	3	27
104	A60205221113	Ms ANAMIKA BAJPAI	100	30	70	A-	8	3	3	24
105	A60205221148	Ms SWETA	100	30	70	A+	10	3	3	30

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106	A60205221150	Ms OJASVI SHARMA	100	30	70	A+	10	3	3	30
107	A60205221123	Mr NARENDRA SINGH YADAV	100	30	70	A	9	3	3	27
108	A60205221140	Ms RAJVINDER KAUR	100	30	70	B+	7	3	3	21
109	A60205221092	Mr JAIDEEP SHARMA	100	30	70	B-	5	3	3	15
110	A60205221179	Mr GAURAV SINGH	100	30	70	B	6	3	3	18
111	A60205221190	Mr ROHIT KUMAR PANDEY	100	30	70	A-	8	3	3	24
112	A60205221128	Mr YASH PATHAK	100	30	70	A	9	3	3	27
113	A60205221161	Ms KHUSHI SHARMA	100	30	70	B	6	3	3	18
114	A60205221152	Ms KHUSHI CHAUHAN	100	30	70	A	9	3	3	27
115	A60205221127	Mr MADHUR GUPTA	100	30	70	B-	5	3	3	15
116	A60205221141	Mr HARENDRA PRATAP SINGH BHADORIYA	100	30	70	A-	8	3	3	24
117	A60205221096	Mr ADITYA PRATAP SINGH	100	30	70	F	0	3	0	0
118	A60205221198	Ms PRIYA SINGH TOMAR	100	30	70	B+	7	3	3	21
119	A60205221205	Ms AARUSHI SABOO	100	30	70	A+	10	3	3	30
120	A60205221138	Ms KHUSHBOO JAIN	100	30	70	A	9	3	3	27

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121	A60205221163	Mr ABHISHEK RAJPUT	100	30	70	B-	5	3	3	15
122	A60205221160	Mr SHISHANK BHATNAGAR	100	30	70	A	9	3	3	27
123	A60205221142	Mr AKASH YADAV	100	30	70	A	9	3	3	27
124	A60205221158	Mr ABHISHEKH SINGH	100	30	70	B+	7	3	3	21
125	A60205221102	Mr PANKAJ KU-MAR	100	30	70	A-	8	3	3	24
126	A60205221202	Ms K. SUKESHINI	100	30	70	B+	7	3	3	21
127	A60205221207	Mr AKSHAT SHANDILYA	100	30	70	A-	8	3	3	24
128	A60205221139	Mr RAVI SINGH TOMAR	100	30	70	B	6	3	3	18
129	A60205221174	Mr RITESH DWIVEDI	100	30	70	A-	8	3	3	24
130	A60205221177	Mr AKHILESH SINGH TOMAR	100	30	70	A-	8	3	3	24
131	A60205221157	Mr ABHISHEK SHARMA	100	30	70	B-	5	3	3	15
132	A60205221166	Mr PRABHANSHU AGASHE	100	30	70	B+	7	3	3	21
133	A60205221120	Mr KUNAL RATHORE	100	30	70	B	6	3	3	18
134	A60205221212	Ms SNEHA BHA-DOURIYA	100	30	70	A-	8	3	3	24
135	A60205221218	Mr VIVEK YADAV	100	30	70	B	6	3	3	18
136	A60205221154	Mr PIYUSH SINGH	100	30	70	A	8	3	3	24

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137	A60205221176	Mr ABHAY SINGH BHADAURIA	100	30	70	A	9	3	3	27
138	A60205221181	Mr RITHIK NAIR	100	30	70	B+	7	3	3	21
139	A60205221168	Mr NAMVER ALI ZAIDI	100	30	70	F	0	3	0	0
140	A60205221169	Ms ARADHNA RAJORIYA	100	30	70	A-	8	3	3	24
141	A60205221125	Mr NISHANT RAJPUT	100	30	70	B+	7	3	3	21
142	A60205221217	Mr AYUSH SINGH	100	30	70	B+	7	3	3	21
143	A60205221222	Ms KRATIKA JADON	100	30	70	A-	8	3	3	24
144	A60205221165	Ms AYUSHI AWASTHI	100	30	70	A	9	3	3	27
145	A60205221180	Ms PRIYANSHI GUPTA	100	30	70	A-	8	3	3	24
146	A60205221183	Mr PRANSHU SHARMA	100	30	70	B+	7	3	3	21
147	A60205221188	Mr UJJWAL SHRIVASTAVA	100	30	70	A	9	3	3	27
148	A60205221189	Mr YOGESH VERMA	100	30	70	B	6	3	3	18
149	A60205221130	Mr GARVIT SINGHAL	100	30	70	B+	7	3	3	21
150	A60205221219	Mr NIKHIL SHARMA	100	30	70	A	9	3	3	27
151	A60205221227	Ms SALONI OJHA	100	30	70	A-	8	3	3	24
152	A60205221171	Ms METTU NAVYA SHREE	100	30	70	B+	7	3	3	21

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153	A60205221215	Mr ROHIT JAIN	100	30	70	A+	10	3	3	30
154	A60205221214	Ms PRIYA KUMARI YADAV	100	30	70	A-	8	3	3	24
155	A60205221197	Ms ANSHIKA DAS	100	30	70	A	9	3	3	27
156	A60205221191	Mr SHREYASH DWIVEDI	100	30	70	B+	7	3	3	21
157	A60205221151	Mr TAPISH SHARMA	100	30	70	F	0	3	0	0
158	A60205221223	Mr ANUJ CHAURASIYA	100	30	70	B	6	3	3	18
159	A60205221254	Mr ABHAY SINGH BHADAURIYA	100	30	70	B-	5	3	3	15
160	A60205221178	Ms AELLI GUPTA	100	30	70	A	9	3	3	27
161	A60205221216	Mr ADITYA PATERIYA	100	30	70	A-	8	3	3	24
162	A60205221231	Ms SANSKRITI GUPTA	100	30	70	A-	8	3	3	24
163	A60205221201	Ms ANUSHKA TRIPATHI	100	30	70	B	6	3	3	18
164	A60205221221	Ms DIVYANSHI BHADORIA	100	30	70	A-	8	3	3	24
165	A60205221153	Mr ARYAN KHAN	100	30	70	F	0	3	0	0
166	A60205221226	Mr ARIN SHARMA	100	30	70	A-	8	3	3	24
167	A60205221261	Ms PRIYANSHI GARG	100	30	70	B+	7	3	3	21
168	A60205221185	Mr KOVURI PRAMOD SAI	100	30	70	B+	7	3	3	21

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169	A60205221220	Mr SHAILENDRA SINGH	100	30	70	B	6	3	3	18
170	A60205221235	Ms HIMANSHI SHARMA	100	30	70	A-	8	3	3	24
171	A60205221246	Mr SATYAM RAJAWAT	100	30	70	A-	8	3	3	24
172	A60205221258	Ms VAISHALI PATERIYA	100	30	70	A-	8	3	3	24
173	A60205221170	Mr VIKAS PATIDAR	100	30	70	A-	8	3	3	24
174	A60205221228	Mr PRAHARSH RAJ SINGH	100	30	70	A	9	3	3	27
175	A60205221277	Mr JATIN SHRIVASTAVA	100	30	70	B+	7	3	3	21
176	A60205221192	Mr VANSH AGGARWAL	100	30	70	A-	8	3	3	24
177	A60205221229	Ms ANANYA SINGH	100	30	70	B	6	3	3	18
178	A60205221237	Ms GARIMA GUPTA	100	30	70	A	9	3	3	27
179	A60205221247	Ms ANUSHKA TOMAR	100	30	70	B+	7	3	3	21
180	A60205221259	Mr KARAN KUMAR CHAURASIA	100	30	70	A	9	3	3	27
181	A60205221172	Mr HARIOM PATEL	100	30	70	A	9	3	3	27
182	A60205221262	Ms ANAMIKA RAJPUT	100	30	70	A-	8	3	3	24
183	A60205221278	Ms DEERGHA TIWARI	100	30	70	A	9	3	3	27
184	A60205221195	Mr ANURAG SINGH TOMAR	100	30	70	F	0	3	0	0

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185	A60205221232	Ms SAKSHI SHAHI	100	30	70	A	9	3	3	27
186	A60205221242	Mr DEVASHISH	100	30	70	B+	7	3	3	21
187	A60205221251	Mr YASH RAGHUVANSHI	100	30	70	A+	10	3	3	30
188	A60205221260	Ms MUSKAN MANGAL	100	30	70	A-	8	3	3	24
189	A60205221184	Ms PRATHA KHARE	100	30	70	B+	7	3	3	21
190	A60205221264	Mr ARNAV SHARMA	100	30	70	A+	10	3	3	30
191	A60205221288	Mr VAIBHAV GARG	100	30	70	A-	8	3	3	24
192	A60205221203	Mr HARSH MAL-VIYA	100	30	70	A	9	3	3	27
193	A60205221234	Ms SHRUTI DIXIT	100	30	70	B+	7	3	3	21
194	A60205221244	Mr ARJIT SHARMA	100	30	70	A	9	3	3	27
195	A60205221256	Mr VIVEK PAL	100	30	70	A	9	3	3	27
196	A60205221289	Mr SHUBHAM DWIVEDI	100	30	70	B+	7	3	3	21
197	A60205221208	Ms MOULI TI-WARI	100	30	70	DE	0	3	0	0
198	A60205221272	Ms ROJA SHARMA	100	30	70	A	9	3	3	27
199	A60205221293	Mr HAPPY BHASIN	100	30	70	B+	7	3	3	21
200	A60205221210	Mr HARSH TI-WARI	100	30	70	B+	7	3	3	21

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201	A60205221236	Ms URVASHI SHARMA	100	30	70	A	9	3	3	27
202	A60205221266	Mr AMIT SINGH	100	30	70	B+	7	3	3	21
203	A60205221257	Ms ROLI TIWARI	100	30	70	B	6	3	3	18
204	A60205221295	Mr PRASHANT KUMAR	100	30	70	A	9	3	3	27
205	A60205221211	Mr DEVASHISH PANDEY	100	30	70	A-	8	3	3	24
206	A60205221274	Mr ADITYA RATHORE	100	30	70	A-	8	3	3	24
207	A60205221294	Ms RIYA SINGH	100	30	70	A-	8	3	3	24
208	A60205221224	Mr SHIVAM UPADHYAY	100	30	70	B+	7	3	3	21
209	A60205221241	Mr SANTOSH SINGH TOMAR	100	30	70	B+	7	3	3	21
210	A60205221268	Ms SHRAVANI VAIDYA	100	30	70	A	9	3	3	27
211	A60205221290	Mr SUJAL MAU-RYA	100	30	70	B-	5	3	3	15
212	A60205221296	Mr YASH RAI	100	30	70	A	9	3	3	27
213	A60205221243	Ms SHRUTI SINGH KUSHWAH	100	30	70	A	9	3	3	27
214	A60205221285	Ms SAKSHI UPADHYAY	100	30	70	A-	8	3	3	24
215	A60205221306	Mr ANKIT KAURAV	100	30	70	A-	8	3	3	24
216	A60205221225	Mr ADARSH KUSHWAH	100	30	70	A	8	3	3	24

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217	A60205221265	Mr KAUSTUBH ADITYA SHARMA	100	30	70	F	0	3	0	0
218	A60205221270	Ms YASHIKA UPADHYAY	100	30	70	A+	10	3	3	30
219	A60205221297	Mr ANUBHAV SHARMA	100	30	70	B	6	3	3	18
220	A60205221299	Mr ABHISHEK SHARMA	100	30	70	A-	8	3	3	24
221	A60205221253	Mr NILAY KUMAR SINGH	100	30	70	B	6	3	3	18
222	A60205221287	Ms RITI MEENA	100	30	70	B+	7	3	3	21
223	A60205221298	Mr VIBHOR AGRAWAL	100	30	70	A-	8	3	3	24
224	A60205221249	Mr PIYUSH SHUKLA	100	30	70	A-	8	3	3	24
225	A60205221267	Mr AMIT RAI	100	30	70	A	9	3	3	27
226	A60205221281	Mr SUJAL SHAKYA	100	30	70	A-	8	3	3	24
227	A60205221300	Mr VAIBHAV SINGH	100	30	70	A-	8	3	3	24
228	A60205221305	Ms BHARTI SAHU	100	30	70	A-	8	3	3	24
229	A60205221282	Mr HEMRAJ PATHAK	100	30	70	B+	7	3	3	21
230	A60205221309	Mr DEEP MA-THUR	100	30	70	B+	7	3	3	21
231	A60205221303	Mr AYUSH JOON	100	30	70	A	9	3	3	27
232	A60205221252	Mr RUPESH SINGH	100	30	70	B	5	3	3	15

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233	A60205221269	Mr SAHITYA SATYA	100	30	70	A	9	3	3	27
234	A60205221310	Mr MRADUL SINGH RAJAWAT	100	30	70	A+	10	3	3	30
235	A60205221271	Mr HARSH SHARMA	100	30	70	A-	8	3	3	24
236	A60205221263	Mr DEVESH SHAH	100	30	70	A	9	3	3	27
237	A60205221273	Ms ARPITA BHARGAVA	100	30	70	A-	8	3	3	24
238	A60205221312	Mr GAURAV VYAS	100	30	70	B+	7	3	3	21
239	A60205221286	Mr DEVANSH TOMAR	100	30	70	B	6	3	3	18
240	A60205221275	Mr ABHAY SINGH CHANDEL	100	30	70	B+	7	3	3	21
241	A60205221308	Mr KARTIK NEDI-YARA	100	30	70	A	9	3	3	27
242	A60205221291	Mr RISHEEK SHUKLA	100	30	70	A	9	3	3	27
243	A60205221301	Ms ANGEL RAJ-PUT	100	30	70	A	9	3	3	27
244	A60205221311	Mr AJAY SINGH GANGWAR	100	30	70	B+	7	3	3	21
							1746			

Average Grade Point = 1746/244 (Total Grade point/Total no of students) = 7.15
No of students getting greater than average (7.15) marks = 129 students = 52.8%

Total No. of Students	=	**244**

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Level 2	>50% average marks and < 60% average marks	**52.8%**
Attainment Level		**Level 2**

Note: Attainment Level

Level 1	<50% - Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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AMITY UNIVERSITY

MADHYA PRADESH

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

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : PROBLEM SOLVING TECHNIQUES LAB
Course Code : CSE624, Crédits : 02, Session :2023-24(Even Sem.), Class : B.Tech. 3RD Year
Faculty Name : Dr. Madhavi Dhingra

A. **Introduction:** The objective of this course is to write the programs for solving problems using the concept of C,C++ and data structures and develop knowledge of basic data structures for storage and retrieval of ordered or unordered data.

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

CSE624.1 Understand various concepts of C Programming and data structure.

CSE624.2 Apply C programming concepts to solve various problems.

CSE624.3 Implement various data structures in programming language.

CSE624.4 Implement various object oriented concepts to solve problems.

CSE624.5 Apply various data structure such as stacks, queues, trees and graphs to solve various computing problems using C/C++ programming language.

C. Program Outcomes:

[PO1].Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

[**PO2]. Problem Analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

[**PO3]. Design/Development of Solutions**:Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

[**PO4]. Conduct Investigations of Complex Problems**:Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

[**PO5]. Modern Tool Usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

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[**PO6]. The Engineer and Society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

[**PO7]. Environment and Sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

[**PO8]. Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

[**PO9]. Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

[**PO10]. Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

[**PO11]. 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.

[**PO12]. Project Management and Finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Program Specific Outcomes:

PSO1. Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.
PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.
PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term Viva	CT	15%
	Mid Term Viva		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/ Q/HA	10%

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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 allowanceof 25% includes all types of leaves Including medical leaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F.
F.

F. Syllabus

Programming in C : (10 Hours)

1. Write a simple program based on operators (pre, post increment, bitwise and, or, etc.).
2. Write a simple program based on conversions (from int to float & float to int)
3. Write a program for find the max and min from the three numbers.
4. Write the program for the simple, compound interest.
5. Write program for students marks grading.
6. C program to check whether a given number is odd or even.
7. C program to Add digits of input number.
8. C program to Factorial of a given number.
9. C program to swap two numbers without using third variable.
10. C program to check whether a given year is leap year or not.
11. C program to check whether a given number Palindrome Number or not.
12. C programs to print different patterns.
13. Program for the following using switch statement: **Menu:-** (a) Sum of two numbers (b) Negative or Positive Number (c) Simple Interest (d) Area of Circle (e) Exit
14. C program to check whether a given number Prime Number or not.
15. C program to check whether a given number Armstrong Number or not.
16. C program to print Fibonacci series up to given term.
17. C program to find out sum of 10 numbers by using array.
18. C program to reverses of one array elements into another.
19. C program to find out maximum and minimum number in an array.
20. Write a C program that uses functions to perform the following: (a) Addition of Two Matrices (b) Multiplication of Two Matrices (c) Transpose of a matrix
21. C program to Factorial of a given number by using user define function.
22. Write a program for display values reverse order from array using pointer.
23. Write a program through pointer variable to sum of n elements from array.
24. Write a C program which copies one file to another.

Object Oriented Programming in C++ : (10 Hours)

1. Write a program that show the concept of class and object and having function for addition,subtraction,multiplication and division of two number.
2. Program that show the concept of inline function.
3. Program that show the concept of friend function.
4. Program that show the concept of all types of constructor and destructor.
5. Program tha

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6. Program that show the concept of local object and global object.
7. Program that show the concept of static class data and static member function.
8. Program that show the concept of constant member data and function .
9. Program that show the concept of dynamic memory allocation.
10. Program that show the concept of multiple inheritance.
11. Program that show the concept of multilevel inheritance.
12. Program that show the concept of function overloading.
13. Program that show the concept of function overriding.
14. Program that illustrates the order of execution of constructors and destructors when new class is derived from more than one base class.
15. Program that show the concept of operator overloading (overload ++ operator).
16. Program that overload +,- for addition and subtraction of two complex number.
17. Program that show the concept of this pointer.
18. Program that illustrates how run time polymorphism is achieved using virtual functions.
19. Program that illustrates the role of virtual base class in building class hierarchy.
20. Program that illustrates the role of abstract class in building class hierarchy.

Data Structure : (20 Hours)

1. Write a C/C++ program that uses functions to perform the following: i) Create a singly linked list of integers. ii) Delete a given integer from the above linked list. iii) Display the contents of the above list after deletion.
2. Write a C/C++ program that uses functions to perform the following: i) Create a doubly linked list of integers. ii) Delete a given integer from the above doubly linked list. iii) Display the contents of the above list after deletion.
3. Write a C/C++ program that implement the concept of Stack using array/link list.
4. Write a C/C++ program that implement the concept of Queue using array/link list..
5. Write a C/C++ program that implement the concept of Circular Queue.
6. Write a C/C++ program that implement the solution of Tower of Hanoi problem.
7. Write a C/C++ program that uses stack operations to convert a given infix expression into its postfix Equivalent.
8. Write a C/C++ program that uses functions to perform the following: i) Create a binary search tree of characters. ii) Traverse the above Binary search tree recursively in postorder.
9. Write a C/C++ program that uses functions to perform the following: i) Create a binary search tree of integers. ii) Traverse the above Binary search tree non recursively in order.
10. Write C/C++ programs for implementing the following sorting methods to arrange a list of integers in ascending order: i) Insertion sort ii) Bubble Sort iii) Insertion Sort iv) Quick Sort v) Merge sort vi) Counting Sort etc.
11. Write C/C++ programs for implementing the following graph traversal algorithms: (i)Depth first traversal (ii)Breadth first traversal

G. Examination Scheme:

IA			EE			
A	**PR**	**Practical Based Test**	**Major Experiment**	**Minor Experiment**	**LR**	**Viva**
5	10	15	35	15	10	10

H.

Note: IA –Internal Assessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Text/Reference Books:

- Yashwant Kanetkar, "Let us C", BPB Publications, 2nd Edition, 2001
- Herbe

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- A.R. Venugopal, Rajkumar, T. Ravishanker “Mastering C++”, TMH, 1997
- R. Lafore, “Object Oriented Programming using C++”, BPB Publications, 2004.
- A. M. Tenenbaum, “Data Structures using C & C++”, Prentice-Hall of India Pvt. Ltd., New Delhi.
- Kernighan & Ritchie, “C Programming Language”, The (Ansi C Version), PHI, 2nd Edition.
- “Object Oriented Programming with C++” By E. Balagurusamy.
- Bruno R Preiss, “Data Structures and Algorithms with Object Oriented Design Pattern in C++”, Jhon Wiley & Sons, Inc.
- Gilberg Forozan , “Data Structure – A pseudo code approach with C++”, Cengage Learning, New Delhi

I. Lab Plan

Lab	Topics	Mode of Delivery	Correspond-ing CO	Mode of As-sessing CO
1	1. Write a simple program based on operators (pre, post increment, bitwise and, or, etc.). 2. Write a simple program based on conversions (from int to float & float to int) 3. Write a program for find the max and min from the three numbers. 4. Write the program for the simple, compound interest.	Practical	CSE624.1	Mid Term Viva, Quiz & End Sem Exam
2	5. Write program for students marks grading. 6. C program to check whether a given number is odd or even. 7. C program to Add digits of input number. 8. C program to Factorial of a given number. 9. C program to swap two num-bers without using third varia-ble.	Practical	CSE624.1	Mid Term Viva, Quiz & End Sem Exam

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3	10. C program to check whether a given year is leap year or not. 11. C program to check whether a given number Palindrome Number or not. 12. C programs to print different patterns. 13. Program for the following using switch statement: **Menu:-** (a) Sum of two numbers (b) Negative or Positive Number (c) Simple Interest (d) Area of Circle (e) Exit	Practical	CSE624.1	Mid Term Viva, Quiz & End Sem Exam
4	14. C program to check whether a given number Prime Number or not. 15. C program to check whether a given number Armstrong Number or not. 16. C program to print Fibonacci series up to given term. 17. C program to find out sum of 10 numbers by using array.	Practical	CSE624.1	Mid Term Viva, Quiz & End Sem Exam
5	18. C program to reverses of one array elements into another. 19. C program to find out maximum and minimum number in an array. 20. Write a C program that uses functions to perform the following: (a) Addition of Two Matrices (b) Multiplication of Two Matrices (c) Transpose of a matrix	Practical	CSE624.1	Mid Term Viva, Quiz & End Sem Exam

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6	21. C program to Factorial of a given number by using user define function. 22. Write a program for display values reverse order from array using pointer. 23. Write a program through pointer variable to sum of n elements from array . 24. Write a C program which copies one file to another.	Practical	CSE624.1	Mid Term Viva, Quiz & End Sem Exam
7	1. Write a program that show the concept of class and object and having function for addition,subtraction,multiplication and division of two number. 2. Program that show the concept of inline function. 3. Program that show the concept of friend function. 4. Program that show the concept of all types of constructor and destructor. 5. Program that show the concept of local class and global class. 6. Program that show the concept of local object and global object.	Practical	CSE624.2	Mid Term Viva, Quiz & End Sem Exam
8	7. Program that show the concept of static class data and static member function. 8. Program that show the concept of constant member data and function .	Practical	CSE624.2	Mid Term Viva, Quiz & End Sem Exam
9	9. Program that show the concept of dynamic memory allocation. 10. Program that show the concept of multiple inheritance. 11. Program that show the concept of multilevel inheritance.	Practical	CSE624.2	Mid Term Viva, Quiz & End Sem Exam

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10	12. Program that show the concept of function overloading. 13. Program that show the concept of function overriding. 14. Program that illustrates the order of execution of constructors and destructors when new class is derived from more than one base class.	Practical	CSE624.2	Mid Term Viva, Quiz & End Sem Exam
11	15. Program that show the concept of operator overloading (overload ++ operator). 16. Program that overload +,- for addition and subtraction of two complex number.	Practical	CSE624.2	Mid Term Viva, Quiz & End Sem Exam
12	17. Program that show the concept of this pointer. 18. Program that illustrates how run time polymorphism is achieved using virtual functions. 19. Program that illustrates the role of virtual base class in building class hierarchy. 20. Program that illustrates the role of abstract class in building class hierarchy.	Practical	CSE624.2	Mid Term Viva, Quiz & End Sem Exam
13	1. Write a C/C++ program that uses functions to perform the following: i) Create a singly linked list of integers. ii) Delete a given integer from the above linked list. iii) Display the contents of the above list after deletion. 2. Write a C/C++ program that uses functions to perform the following: i) Create a doubly linked list of integers. ii) Delete a given integer from the above doubly linked list. iii) Display the contents of the above list after deletion.	Practical	CSE624.3	Mid Term Viva, Quiz & End Sem Exam

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14	3. Write a C/C++ program that implement the concept of Stack using array/link list. 4. Write a C/C++ program that implement the concept of Queue using array/link list..	Practical	CSE624.3	Mid Term Viva, Quiz & End Sem Exam
15	5. Write a C/C++ program that implement the concept of Circular Queue.	Practical	CSE624.3	Mid Term Viva, Quiz & End Sem Exam
16	6. Write a C/C++ program that implement the solution of Tower of Hanoi problem.	Practical	CSE624.3	Mid Term Viva, Quiz & End Sem Exam
17	7. Write a C/C++ program that uses stack operations to convert a given infix expression into its postfix Equivalent.	Practical	CSE624.3	Mid Term Viva, Quiz & End Sem Exam
18	8. Write a C/C++ program that uses functions to perform the following: i) Create a binary search tree of characters. ii) Traverse the above Binary search tree recursively in postorder.	Practical	CSE624.3	Mid Term Viva, Quiz & End Sem Exam
19	9. Write a C/C++ program that uses functions to perform the following: i) Create a binary search tree of integers. ii) Traverse the above Binary search tree non recursively in order.	Practical	CSE624.3	Mid Term Viva, Quiz & End Sem Exam

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20	10. Write C/C++ programs for implementing the following sorting methods to arrange a list of integers in ascending order: i) Insertion sort	Practical	CSE624.3	Mid Term Viva, Quiz & End Sem Exam
21	11. Write C/C++ programs for implementing the following sorting methods to arrange a list of integers in ascending order:Bubble Sort	Practical	CSE624.3	Mid Term Viva, Quiz & End Sem Exam
22	12. Write C/C++ programs for implementing the following sorting methods to arrange a list of integers in ascending order: Insertion Sort and Quick Sort	Practical	CSE624.3	Mid Term Viva, Quiz & End Sem Exam
23	13. Write C/C++ programs for implementing the following sorting methods to arrange a list of integers in ascending order: Merge sort and Counting Sort etc.	Practical	CSE624.3	Mid Term Viva, Quiz & End Sem Exam
24	14. Write C/C++ programs for implementing the following graph traversal algorithms: (i)Depth first traversal (ii)Breadth first traversal	Practical	CSE624.3	Mid Term Viva, Quiz & End Sem Exam

J.
J.

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

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CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME-SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE323.1	Understandvariousconceptsof CProgrammin															

	gandd atastructure.															
CSE3223.2	Apply Cprogramming concepts to solve various u	3												1		

	s p r o b l e m s .															
C S E 3 2 3 . 3	Im-ple-men t vari-ous data stru ctur es in pro-gra mmi ng lan-gua ge.	3		1										1		
C S E 3 2 3 . 4	Im-ple-men t vari-ous ob-ject ori-ente d con-cept s to solv e prob lems .	3		1										1		

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CSE323.5	Apply various data structure such as stacks, queues, trees and graphs to solve various computing problems using C/C++ programming language.	3												1		

ATTAINMENT

ESE Marks – CSE 624, PROBLEM SOLVING TECHNIQUES LAB

S. No.	Enrollment No	Student's Name	CSE624 PROBLEM SOLVING TECHNIQUES LAB

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			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U4G4
1	A60205221001	Mr MARAMREDDY ASHISH KUMAR REDDY	100	30	70	B-	5	2	2	10
2	A60205221002	Mr VEDANT GUPTA	100	30	70	DE	0	2	0	0
3	A60205221009	Mr PRANSHUL SHARMA	100	30	70	B+	7	2	2	14
4	A60205221020	Mr HARSH RAJ SINGH CHAUHAN	100	30	70	B-	5	2	2	10
5	A60205221013	Ms PEARL BANSAL	100	30	70	DE	0	2	0	0
6	A60205221010	Mr VANSH GUPTA	100	30	70	B+	7	2	2	14
7	A60205221005	Mr ANURAG SINGH RANA	100	30	70	B-	5	2	2	10
8	A60205221012	Mr ROHIT SHARMA	100	30	70	A-	8	2	2	16
9	A60205221003	Mr SANJAY KUSHWAH	100	30	70	B+	7	2	2	14
10	A60205221004	Mr VISHAL KU-MAR	100	30	70	B	6	2	2	12
11	A60205221016	Mr HARSHIT SHARMA	100	30	70	B	6	2	2	12
12	A60205221035	Mr BIKASH NATH	100	30	70	B-	5	2	2	10
13	A60205221023	Mr VIVEK YADAV	100	30	70	A-	8	2	2	16

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14	A60205221031	Ms MANYATA SINGH	100	30	70	B+	7	2	2	14
15	A60205221011	Ms ANDREA NARCIS	100	30	70	B	6	2	2	12
16	A60205221018	Mr SAHIL KHAN	100	30	70	B	6	2	2	12
17	A60205221007	Mr SUYASH DESHMUKH	100	30	70	B+	7	2	2	14
18	A60205221022	Mr SANSKAR SONI	100	30	70	B	6	2	2	12
19	A60205221021	Mr DHARMENDRA DIWAKAR	100	30	70	A-	8	2	2	16
20	A60205221041	Mr ARYAN SINGH TOMAR	100	30	70	B-	5	2	2	10
21	A60205221025	Mr YASH SHARMA	100	30	70	B-	5	2	2	10
22	A60205221033	Mr SANDEEP SHARMA	100	30	70	B-	5	2	2	10
23	A60205221039	Ms MUSKAN BANSAL	100	30	70	B	6	2	2	12
24	A60205221024	Ms MEGHNA GUPTA	100	30	70	B-	5	2	2	10
25	A60205221046	Mr YASIR KHAN	100	30	70	B-	5	2	2	10
26	A60205221029	Mr PRIYANSHU KUMAR	100	30	70	A-	8	2	2	16
27	A60205221034	Mr TARUN SINGH TOMAR	100	30	70	B+	7	2	2	14
28	A60205221052	Mr ABHINAV KUMAR	100	30	70	A-	8	2	2	16
29	A60205221026	Ms PRAGYA GUPTA	100	30	70	A	8	2	2	16

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30	A60205221071	Ms SWATI GUPTA	100	30	70	B	6	2	2	12
31	A60205221051	Mr VIPUL KUMAR	100	30	70	B-	5	2	2	10
32	A60205221027	Ms SIMRAN SINGH	100	30	70	B+	7	2	2	14
33	A60205221057	Mr MIRIYAM HE-MANTH KUMAR	100	30	70	A-	8	2	2	16
34	A60205221047	Mr ANUSH M K	100	30	70	B	6	2	2	12
35	A60205221036	Ms KARTIKA CHAUHAN	100	30	70	B-	5	2	2	10
36	A60205221061	Mr DEEPENDRA SHARMA	100	30	70	B+	7	2	2	14
37	A60205221038	Ms VANDANA	100	30	70	A	9	2	2	18
38	A60205221081	Mr DEVANSH VERMA	100	30	70	B	6	2	2	12
39	A60205221066	Mr HARSHAVARDHAN CHEVADA-BOINA	100	30	70	B	6	2	2	12
40	A60205221042	Ms KRATI GOYAL	100	30	70	B	6	2	2	12
41	A60205221059	Mr AYUSH TOMAR	100	30	70	B+	7	2	2	14
42	A60205221055	Mr SHIVAM SINGH TOMAR	100	30	70	B+	7	2	2	14
43	A60205221040	Mr SHOBHIT CHATURVEDI	100	30	70	B+	7	2	2	14
44	A60205221073	Mr UTKARSH BHADORIA	100	30	70	B+	7	2	2	14

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45	A60205221054	Mr HIMANSHU SINGH	100	30	70	A	9	2	2	18
46	A60205221099	Mr MANAV PRATAP SINGH TOMAR	100	30	70	B	6	2	2	12
47	A60205221077	Mr BADAL KUSH-WAH	100	30	70	B+	7	2	2	14
48	A60205221053	Mr AYUSH SHARMA	100	30	70	B	6	2	2	12
49	A60205221068	Ms SHRUTI AGARWAL	100	30	70	B+	7	2	2	14
50	A60205221058	Mr AYUSH SHARMA	100	30	70	B	6	2	2	12
51	A60205221062	Mr MAYANK BO-HARE	100	30	70	B	6	2	2	12
52	A60205221076	Mr AKSHAT SHRIVASTAVA	100	30	70	B+	7	2	2	14
53	A60205221056	Mr MORUBOYINA VENKATA SAI AKHIL	100	30	70	B+	7	2	2	14
54	A60205221101	Mr ANUBHAV KHANDELWAL	100	30	70	A-	8	2	2	16
55	A60205221091	Mr YUVRAJ SINGH PARIHAR	100	30	70	B	6	2	2	12
56	A60205221064	Ms NIKHAT FAT-IMA	100	30	70	B	6	2	2	12
57	A60205221080	Mr ABHISHEK SHARMA	100	30	70	B-	5	2	2	10
58	A60205221069	Mr LOVE KUMAR	100	30	70	A-	8	2	2	16
59	A60205221074	Ms SHATAKSHI SHARMA	100	30	70	B+	7	2	2	14

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60	A60205221088	Mr CHIRAG SISODIYA	100	30	70	B+	7	2	2	14
61	A60205221063	Mr ADESH TIWARI	100	30	70	A-	8	2	2	16
62	A60205221111	Ms VAISHALI PATEL	100	30	70	A	9	2	2	18
63	A60205221098	Mr SUYASH PATHAK	100	30	70	B+	7	2	2	14
64	A60205221079	Mr PRIYANSHU TANGAR	100	30	70	B	6	2	2	12
65	A60205221082	Mr MOKSH TIWARI	100	30	70	A-	8	2	2	16
66	A60205221085	Mr HRISHI SHARMA	100	30	70	A	9	2	2	18
67	A60205221075	Mr SHUBHAM GOYAL	100	30	70	B+	7	2	2	14
68	A60205221106	Mr ROHAN RAKSHIT	100	30	70	B	6	2	2	12
69	A60205221065	Mr ABHISHEK SINGH	100	30	70	B+	7	2	2	14
70	A60205221131	Mr SHIVANK SINGH BHADAURIA	100	30	70	A	9	2	2	18
71	A60205221126	Mr VISHNU SHARMA	100	30	70	A+	10	2	2	20
72	A60205221083	Mr RAJ SHARMA	100	30	70	B	6	2	2	12
73	A60205221094	Ms PURVI GUPTA	100	30	70	A-	8	2	2	16
74	A60205221095	Mr SURAJ SINGH TOMAR	100	30	70	B+	7	2	2	14

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75	A60205221087	Mr KONJETI MOHAN SAI AKHIL	100	30	70	B	6	2	2	12
76	A60205221109	Mr DODLA AJAY KUMAR	100	30	70	A-	8	2	2	16
77	A60205221078	Ms ISHU KUSHWAH	100	30	70	A-	8	2	2	16
78	A60205221137	Ms SNEHA GUPTA	100	30	70	B-	5	2	2	10
79	A60205221132	Mr KISHAN RATHORE	100	30	70	B+	7	2	2	14
80	A60205221089	Ms VANSHIKA SISODIYA	100	30	70	A	9	2	2	18
81	A60205221100	Mr ANMOL KUMAR	100	30	70	B	6	2	2	12
82	A60205221105	Mr KARANVEER SINGH RAJAWAT	100	30	70	B	6	2	2	12
83	A60205221107	Mr ANURAG SINGH BHADORIA	100	30	70	B+	7	2	2	14
84	A60205221121	Mr JYOTIRADITYA KUMAR SHRIVASTAVA	100	30	70	A-	8	2	2	16
85	A60205221084	Mr DEVESH SHRIVAS	100	30	70	B	6	2	2	12
86	A60205221147	Mr YASH KUMAR SAH	100	30	70	B+	7	2	2	14
87	A60205221156	Mr RAJ SINGH RAJAWAT	100	30	70	A-	8	2	2	16
88	A60205221093	Mr RAHUL SINGH DHAKAD	100	30	70	B	6	2	2	12
89	A60205221116	Mr ISHAAN DHINGRA	100	30	70	A-	8	2	2	16

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90	A60205221133	Mr PRATIK KUMAR JHA	100	30	70	B+	7	2	2	14
91	A60205221108	Ms VEDIKA YERUNKAR	100	30	70	A-	8	2	2	16
92	A60205221124	Mr ARYAN VYAS	100	30	70	B-	5	2	2	10
93	A60205221086	Mr SANDEEP YADAV	100	30	70	A-	8	2	2	16
94	A60205221162	Mr DEVANSH CHATURVEDI	100	30	70	B+	7	2	2	14
95	A60205221167	Mr AASHI GUPTA	100	30	70	A	9	2	2	18
96	A60205221103	Ms SUCHI JAIN	100	30	70	B-	5	2	2	10
97	A60205221129	Mr AJAY PARIHAR	100	30	70	A-	8	2	2	16
98	A60205221149	Mr DEVANSH DUBEY	100	30	70	A	9	2	2	18
99	A60205221112	Ms SMRUTI SRADHA JENA	100	30	70	B+	7	2	2	14
100	A60205221135	Mr HARSHVARDHAN SINGH TOMAR	100	30	70	B+	7	2	2	14
101	A60205221090	Mr SAKSHAM JAIN	100	30	70	A-	8	2	2	16
102	A60205221164	Mr SATISH KUMAR	100	30	70	B	6	2	2	12
103	A60205221173	Ms VAISHNAVI	100	30	70	B	6	2	2	12
104	A60205221113	Ms ANAMIKA BAJPAI	100	30	70	B	6	2	2	12

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105	A60205221148	Ms SWETA	100	30	70	B	6	2	2	12
106	A60205221150	Ms OJASVI SHARMA	100	30	70	B+	7	2	2	14
107	A60205221123	Mr NARENDRA SINGH YADAV	100	30	70	B	6	2	2	12
108	A60205221140	Ms RAJVINDER KAUR	100	30	70	B+	7	2	2	14
109	A60205221092	Mr JAIDEEP SHARMA	100	30	70	B	6	2	2	12
110	A60205221179	Mr GAURAV SINGH	100	30	70	B+	7	2	2	14
111	A60205221190	Mr ROHIT KUMAR PANDEY	100	30	70	B	6	2	2	12
112	A60205221128	Mr YASH PATHAK	100	30	70	B+	7	2	2	14
113	A60205221161	Ms KHUSHI SHARMA	100	30	70	B+	7	2	2	14
114	A60205221152	Ms KHUSHI CHAUHAN	100	30	70	B-	5	2	2	10
115	A60205221127	Mr MADHUR GUPTA	100	30	70	B	6	2	2	12
116	A60205221141	Mr HARENDRA PRATAP SINGH BHADORIYA	100	30	70	A+	10	2	2	20
117	A60205221096	Mr ADITYA PRATAP SINGH	100	30	70	A	9	2	2	18
118	A60205221198	Ms PRIYA SINGH TOMAR	100	30	70	A-	8	2	2	16
119	A60205221205	Ms AARUSHI SABOO	100	30	70	A	9	2	2	18

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120	A60205221138	Ms KHUSHBOO JAIN	100	30	70	B+	7	2	2	14
121	A60205221163	Mr ABHISHEK RAJPUT	100	30	70	B+	7	2	2	14
122	A60205221160	Mr SHISHANK BHATNAGAR	100	30	70	B+	7	2	2	14
123	A60205221142	Mr AKASH YADAV	100	30	70	B+	7	2	2	14
124	A60205221158	Mr ABHISHEKH SINGH	100	30	70	B	6	2	2	12
125	A60205221102	Mr PANKAJ KU-MAR	100	30	70	A-	8	2	2	16
126	A60205221202	Ms K. SUKESHINI	100	30	70	A-	8	2	2	16
127	A60205221207	Mr AKSHAT SHANDILYA	100	30	70	A	9	2	2	18
128	A60205221139	Mr RAVI SINGH TOMAR	100	30	70	A+	10	2	2	20
129	A60205221174	Mr RITESH DWIVEDI	100	30	70	A-	8	2	2	16
130	A60205221177	Mr AKHILESH SINGH TOMAR	100	30	70	A	9	2	2	18
131	A60205221157	Mr ABHISHEK SHARMA	100	30	70	A	9	2	2	18
132	A60205221166	Mr PRABHANSHU AGASHE	100	30	70	B+	7	2	2	14
133	A60205221120	Mr KUNAL RATHORE	100	30	70	A	9	2	2	18
134	A60205221212	Ms SNEHA BHA-DOURIYA	100	30	70	A	9	2	2	18
135	A60205221218	Mr VIVEK YADAV	100	30	70	A	9	2	2	18

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136	A60205221154	Mr PIYUSH SINGH	100	30	70	B+	7	2	2	14
137	A60205221176	Mr ABHAY SINGH BHADAURIA	100	30	70	A-	8	2	2	16
138	A60205221181	Mr RITHIK NAIR	100	30	70	B	6	2	2	12
139	A60205221168	Mr NAMVER ALI ZAIDI	100	30	70	B+	7	2	2	14
140	A60205221169	Ms ARADHNA RA-JORIYA	100	30	70	A-	8	2	2	16
141	A60205221125	Mr NISHANT RAJ-PUT	100	30	70	A-	8	2	2	16
142	A60205221217	Mr AYUSH SINGH	100	30	70	A+	10	2	2	20
143	A60205221222	Ms KRATIKA JA-DON	100	30	70	A-	8	2	2	16
144	A60205221165	Ms AYUSHI AWASTHI	100	30	70	A	9	2	2	18
145	A60205221180	Ms PRIYANSHI GUPTA	100	30	70	A-	8	2	2	16
146	A60205221183	Mr PRANSHU SHARMA	100	30	70	B+	7	2	2	14
147	A60205221188	Mr UJJWAL SHRIVASTAVA	100	30	70	B	6	2	2	12
148	A60205221189	Mr YOGESH VERMA	100	30	70	A-	8	2	2	16
149	A60205221130	Mr GARVIT SINGHAL	100	30	70	A	9	2	2	18
150	A60205221219	Mr NIKHIL SHARMA	100	30	70	B+	7	2	2	14
151	A60205221227	Ms SALONI OJHA	100	30	70	A	9	2	2	18

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152	A60205221171	Ms METTU NAVYA SHREE	100	30	70	A	9	2	2	18
153	A60205221215	Mr ROHIT JAIN	100	30	70	B-	5	2	2	10
154	A60205221214	Ms PRIYA KUMARI YADAV	100	30	70	A-	8	2	2	16
155	A60205221197	Ms ANSHIKA DAS	100	30	70	B	6	2	2	12
156	A60205221191	Mr SHREYASH DWIVEDI	100	30	70	A-	8	2	2	16
157	A60205221151	Mr TAPISH SHARMA	100	30	70	B	6	2	2	12
158	A60205221223	Mr ANUJ CHAURASIYA	100	30	70	B+	7	2	2	14
159	A60205221254	Mr ABHAY SINGH BHADAURIYA	100	30	70	B+	7	2	2	14
160	A60205221178	Ms AELLI GUPTA	100	30	70	A-	8	2	2	16
161	A60205221216	Mr ADITYA PATERIYA	100	30	70	B+	7	2	2	14
162	A60205221231	Ms SANSKRITI GUPTA	100	30	70	A-	8	2	2	16
163	A60205221201	Ms ANUSHKA TRIPATHI	100	30	70	A-	8	2	2	16
164	A60205221221	Ms DIVYANSHI BHADORIA	100	30	70	B	6	2	2	12
165	A60205221153	Mr ARYAN KHAN	100	30	70	A	9	2	2	18
166	A60205221226	Mr ARIN SHARMA	100	30	70	A	9	2	2	18
167	A60205221261	Ms PRIYANSHI GARG	100	30	70	B	6	2	2	12

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168	A60205221185	Mr KOVURI PRAMOD SAI	100	30	70	A-	8	2	2	16
169	A60205221220	Mr SHAILENDRA SINGH	100	30	70	B+	7	2	2	14
170	A60205221235	Ms HIMANSHI SHARMA	100	30	70	A+	10	2	2	20
171	A60205221246	Mr SATYAM RA-JAWAT	100	30	70	B+	7	2	2	14
172	A60205221258	Ms VAISHALI PATERIYA	100	30	70	A+	10	2	2	20
173	A60205221170	Mr VIKAS PATI-DAR	100	30	70	B+	7	2	2	14
174	A60205221228	Mr PRAHARSH RAJ SINGH	100	30	70	A+	10	2	2	20
175	A60205221277	Mr JATIN SHRIVASTAVA	100	30	70	B	6	2	2	12
176	A60205221192	Mr VANSH AG-GARWAL	100	30	70	B	6	2	2	12
177	A60205221229	Ms ANANYA SINGH	100	30	70	A	9	2	2	18
178	A60205221237	Ms GARIMA GUPTA	100	30	70	B+	7	2	2	14
179	A60205221247	Ms ANUSHKA TOMAR	100	30	70	A-	8	2	2	16
180	A60205221259	Mr KARAN KU-MAR CHAURASIA	100	30	70	A	9	2	2	18
181	A60205221172	Mr HARIOM PA-TEL	100	30	70	B+	7	2	2	14
182	A60205221262	Ms ANAMIKA RAJPUT	100	30	70	B+	7	2	2	14
183	A60205221278	Ms DEERGHA TI-WARI	100	30	70	A	8	2	2	16

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184	A60205221195	Mr ANURAG SINGH TOMAR	100	30	70	B+	7	2	2	14
185	A60205221232	Ms SAKSHI SHAHI	100	30	70	B	6	2	2	12
186	A60205221242	Mr DEVASHISH	100	30	70	A	9	2	2	18
187	A60205221251	Mr YASH RAGHUVANSHI	100	30	70	A	9	2	2	18
188	A60205221260	Ms MUSKAN MANGAL	100	30	70	A	9	2	2	18
189	A60205221184	Ms PRATHA KHARE	100	30	70	A+	10	2	2	20
190	A60205221264	Mr ARNAV SHARMA	100	30	70	A	9	2	2	18
191	A60205221288	Mr VAIBHAV GARG	100	30	70	A-	8	2	2	16
192	A60205221203	Mr HARSH MALVIYA	100	30	70	A	9	2	2	18
193	A60205221234	Ms SHRUTI DIXIT	100	30	70	B	6	2	2	12
194	A60205221244	Mr ARJIT SHARMA	100	30	70	A-	8	2	2	16
195	A60205221256	Mr VIVEK PAL	100	30	70	A-	8	2	2	16
196	A60205221289	Mr SHUBHAM DWIVEDI	100	30	70	A	9	2	2	18
197	A60205221208	Ms MOULI TIWARI	100	30	70	A-	8	2	2	16
198	A60205221272	Ms ROJA SHARMA	100	30	70	A	9	2	2	18
199	A60205221293	Mr HAPPY BHASIN	100	30	70	A+	10	2	2	20

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200	A60205221210	Mr HARSH TIWARI	100	30	70	A	9	2	2	18
201	A60205221236	Ms URVASHI SHARMA	100	30	70	A+	10	2	2	20
202	A60205221266	Mr AMIT SINGH	100	30	70	B	6	2	2	12
203	A60205221257	Ms ROLI TIWARI	100	30	70	A-	8	2	2	16
204	A60205221295	Mr PRASHANT KUMAR	100	30	70	B+	7	2	2	14
205	A60205221211	Mr DEVASHISH PANDEY	100	30	70	A-	8	2	2	16
206	A60205221274	Mr ADITYA RATHORE	100	30	70	A-	8	2	2	16
207	A60205221294	Ms RIYA SINGH	100	30	70	A-	8	2	2	16
208	A60205221224	Mr SHIVAM UPADHYAY	100	30	70	A+	10	2	2	20
209	A60205221241	Mr SANTOSH SINGH TOMAR	100	30	70	A-	8	2	2	16
210	A60205221268	Ms SHRAVANI VAIDYA	100	30	70	A	9	2	2	18
211	A60205221290	Mr SUJAL MAURYA	100	30	70	B+	7	2	2	14
212	A60205221296	Mr YASH RAI	100	30	70	A	9	2	2	18
213	A60205221243	Ms SHRUTI SINGH KUSHWAH	100	30	70	A	9	2	2	18
214	A60205221285	Ms SAKSHI UPADHYAY	100	30	70	A+	10	2	2	20
215	A60205221306	Mr ANKIT KAURAV	100	30	70	B+	7	2	2	14

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216	A60205221225	Mr ADARSH KUSHWAH	100	30	70	A	9	2	2	18
217	A60205221265	Mr KAUSTUBH ADITYA SHARMA	100	30	70	B+	7	2	2	14
218	A60205221270	Ms YASHIKA UPADHYAY	100	30	70	A	9	2	2	18
219	A60205221297	Mr ANUBHAV SHARMA	100	30	70	A-	8	2	2	16
220	A60205221299	Mr ABHISHEK SHARMA	100	30	70	A-	8	2	2	16
221	A60205221253	Mr NILAY KUMAR SINGH	100	30	70	A-	8	2	2	16
222	A60205221287	Ms RITI MEENA	100	30	70	A	9	2	2	18
223	A60205221298	Mr VIBHOR AGRAWAL	100	30	70	B	6	2	2	12
224	A60205221249	Mr PIYUSH SHUKLA	100	30	70	A	9	2	2	18
225	A60205221267	Mr AMIT RAI	100	30	70	B	6	2	2	12
226	A60205221281	Mr SUJAL SHAKYA	100	30	70	A+	10	2	2	20
227	A60205221300	Mr VAIBHAV SINGH	100	30	70	A-	8	2	2	16
228	A60205221305	Ms BHARTI SAHU	100	30	70	A	9	2	2	18
229	A60205221282	Mr HEMRAJ PATHAK	100	30	70	A	9	2	2	18
230	A60205221309	Mr DEEP MA-THUR	100	30	70	B+	7	2	2	14
231	A60205221303	Mr AYUSH JOON	100	30	70	B+	7	2	2	14

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232	A60205221252	Mr RUPESH SINGH	100	30	70	A-	8	2	2	16
233	A60205221269	Mr SAHITYA SATYA	100	30	70	B+	7	2	2	14
234	A60205221310	Mr MRADUL SINGH RAJAWAT	100	30	70	A	9	2	2	18
235	A60205221271	Mr HARSH SHARMA	100	30	70	A-	8	2	2	16
236	A60205221263	Mr DEVESH SHAH	100	30	70	A	9	2	2	18
237	A60205221273	Ms ARPITA BHARGAVA	100	30	70	A	9	2	2	18
238	A60205221312	Mr GAURAV VYAS	100	30	70	A	9	2	2	18
239	A60205221286	Mr DEVANSH TOMAR	100	30	70	A+	10	2	2	20
240	A60205221275	Mr ABHAY SINGH CHANDEL	100	30	70	B+	7	2	2	14
241	A60205221308	Mr KARTIK NEDI-YARA	100	30	70	A-	8	2	2	16
242	A60205221291	Mr RISHEEK SHUKLA	100	30	70	A-	8	2	2	16
243	A60205221301	Ms ANGEL RAJ-PUT	100	30	70	A-	8	2	2	16
244	A60205221311	Mr AJAY SINGH GANGWAR	100	30	70	A	9	2	2	18
							1804			

Average Grade Point = 1804/244 (Total Grade point/Total no of students) = 7.39
No of students getting greater than average (7.39) marks = 117 students = 47.9%

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Total No. of Students	**=**	**244**
Level 1	<50% - Average marks	**47.9%**
Attainment Level		**Level 1**

Note: Attainment Level

Level 1	<50% - Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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AMITY UNIVERSITY

MADHYA PRADESH

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

Course : IOT SENSORS AND DEVICES

Course Code : CSI 201, Crédits : 03, Session :2022-23(Even Sem.), Class : B.Tech. I Year

Faculty Name : Dr.Subendru Nyogi

A. **Introduction:**To provide an overview on IoT tools and applications including sensing devices, actuation, processing and communications. To introduce hands-on IoT concepts including sensing, actuation, and communication through lab exercises with IoT development kits.

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

CSI 201.1 Understand the environmental parameters for IoT.
CSI 201.2 Applythe sensors for various applications of IoT.
CSI 201.3 Understand the concepts of fractional order element.
CSI 201.4 Demonstrate the architecture for various sensors.
CSI 201.5 Evaluate various smart sensors for real world applications.

C. **Programme Outcomes:**

[PO.1].Engineeringknowledge:Applytheknowledgeofmathematics,science,engineeringfundamentals,andanengineeringspecializationtothesolutionofcomplexengineeringproblems

[PO.2]. Problem analysis: Identify, formulate, research literature, and analyze complex engineeringproblems reaching substantiated conclusions using first principles of mathematics, natural sciences,andengineeringsciences

[PO.3]. Design/development of solutions: Design solutions for complex engineering problems and designsystem components or processes that meet the specified needs with appropriate consideration for thepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of theinformationtoprovidevalidconclusions

[PO.5].Moderntoolusage:Create,select,andapplyappropriatetechniques,resources,andmodernengineering and IT tools including prediction and modeling to complex engineering activities with anunderstandingofthelimitations

[PO.6]. The engineer and society: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to theprofessionalengineeringpractice

[PO.7]. Environment and sustainability: Understand the impact of the professional engineering solutions in societalandenvironmentalcontexts,anddemonstratetheknowledgeof,andneedforsustainabledevelopment

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[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities andnorms oftheengineeringpractices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverseteams,andinmultidisciplinarysettings

[PO.10].**Communication**:Communicateeffectivelyoncomplexengineeringactivitieswiththeengineering community and with society at large, such as, being able to comprehend and write effective reports anddesigndocumentation,makeeffectivepresentations,andgiveandreceiveclearinstructions

[PO.11].**Projectmanagementandfinance**:Demonstrateknowledgeandunderstandingoftheengineering andmanagementprinciplesandapplythesetoone'sownwork,asamemberandleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments

[PO.12].**Life-longlearning**:Recognizetheneedfor,andhavethepreparationandabilityto engageinindependent andlife-longlearninginthebroadestcontextoftechnologicalchange

D. Programme Specific Outcomes:

PSO1:Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO 2: Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO 3: Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleavesincludingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

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F. Syllabus

Module I: Environmental Parameters Measurement and Monitoring: (8 hours)

Environmental Parameters Measurement and Monitoring: Why measurement and monitoring are important, effects of adverse parameters for the living being, Sensors: Working Principles: Different types; Selection of Sensors for Practical Applications.

Module II: Sensors: (6 hours)

Introduction of Different Types of Sensors such as Capacitive, Resistive, Surface Acoustic Wave for Temperature, Pressure, Humidity, Toxic Gas etc, Important Characteristics of Sensors: Determination of the Characteristics.

Module III: Fractional Order Element: (8 hours)

Fractional order element: Constant Phase Impedance for sensing applications such as humidity, water quality, milk quality, Impedance Spectroscopy: Equivalent circuit of Sensors and Modelling of Sensors, Importance and Adoption of Smart Sensors

Module IV: Architecture of Smart Sensors: (8 hours)

Architecture of Smart Sensors: Important components, their features, Fabrication of Sensor and Smart Sensor: Electrode fabrication: Screen printing, Photolithography, Electroplating Sensing film deposition: Physical and chemical Vapor, Anodization, Sol-gel, Interface Electronic Circuit for Smart Sensors and Challenges for Interfacing the Smart Sensor, Usefulness of Silicon Technology in Smart Sensor And Future scope of research in smart sensor.Components

G. 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

H. Suggested Text/Reference Books:

Text & References:

- Sensors & Transducers, Patranabis
- Measurement Systems (Application & Design), E.D.Doebelin
- Transducers & Instrumentation, Rangan Mani Sharma
- R. Buyya, A. V. Dastjerdi, Internet of Things: Principles and Paradigms, Cambridge, MA, 2016

Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction of IOT sensors	Lecture	CSI 201.1	Mid Term-1, Quiz & End Sem Exam

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2	Describe the IOT devices	Lecture	CSI 201.1	Mid Term-1, Quiz & End Sem Exam
3	Environmental Parameters	Lecture	CSI 201.1	Mid Term-1, Quiz & End Sem Exam
4	Measurement and Monitoring	Lecture	CSI 201.1	Mid Term-1, Quiz & End Sem Exam
5	Why measurement?	Lecture	CSI 201.1	Mid Term-1, Quiz & End Sem Exam
6	Why monitoring are important ?	Lecture	CSI 201.1	Mid Term-1, Quiz & End Sem Exam
7	effects of adverse parameters	Lecture	CSI 201.1	Mid Term-1, Quiz & End Sem Exam
8	effects of adverse parameters for the living being	Lecture	CSI 201.1	Mid Term-1, Quiz & End Sem Exam
9	Sensors: Working Principles	Lecture	CSI 201.1	Mid Term-1, Quiz & End Sem Exam
10	Different categories of IOT sensors & devices	Lecture	CSI 201.1	Mid Term-1, Quiz & End Sem Exam
11	Selection of Sensors for Practical Applications.	Lecture	CSI 201.1	Mid Term-1, Quiz & End Sem Exam
12	Introduction of Different Types of Sensors	Lecture	CSI 201.2	Mid Term-1, Quiz & End Sem Exam
13	Capacitive, Resistive,	Lecture	CSI 201.2	Mid Term-1, Quiz & End Sem Exam

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14	Surface Acoustic Wave for Temperature	Lecture	CSI 201.2	Mid Term-1, Quiz & End Sem Exam
15	Pressure	Lecture	CSI 201.2	Mid Term-1, Quiz & End Sem Exam
16	Humidity	Lecture	CSI 201.2	Mid Term-1, Quiz & End Sem Exam
17	Toxic Gas	Lecture	CSI 201.2	Mid Term-1, Quiz & End Sem Exam
18	Important Characteristics of Sensors	Lecture	CSI 201.2	Mid Term-1, Quiz & End Sem Exam
19	Determination of the Characteristics.	Lecture	CSI 201.2	Mid Term-1, Quiz & End Sem Exam
20	Fractional order element	Lecture	CSI 201.3	Mid Term-1, Quiz & End Sem Exam
21	Constant Phase Impedance	Lecture	CSI 201.3	Mid Term Viva/Quiz & End Sem Practical Exam
22	sensing applications such as humidity	Lecture	CSI 201.3	Mid Term-1, Quiz & End Sem Exam
23	water quality	Lecture	CSI 201.3	Mid Term-1, Quiz & End Sem Exam
24	milk quality	Lecture	CSI 201.3	Mid Term-1, Quiz & End Sem Exam
25	Impedance Spectroscopy	Lecture	CSI 201.3	Mid Term-1, Quiz & End Sem Exam

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26	Equivalent circuit of Sensors	Lecture	CSI 201.3	Mid Term-1, Quiz & End Sem Exam
27	Modelling of Sensors	Lecture	CSI 201.3	Mid Term-1, Quiz & End Sem Exam
28	Importance and Adoption of Smart Sensors	Lecture	CSI 201.3	Mid Term-1, Quiz & End Sem Exam
29	Architecture of Smart Sensors	Lecture	CSI 201.4	Mid Term-1, Quiz & End Sem Exam
30	Important components, their features,	Lecture	CSI 201.4	Mid Term-1, Quiz & End Sem Exam
31	Fabrication of Sensor and Smart Sensor	Lecture	CSI 201.5	Mid Term-1, Quiz & End Sem Exam
32	Electrode fabrication: Screen printing&Photolithography	Lecture	CSI 201.5	Mid Term-1, Quiz & End Sem Exam
33	Electroplating Sensing film deposition	Lecture	CSI 201.5	Mid Term-1, Quiz & End Sem Exam
34	Anodization, Sol-gel	Lecture	CSI 201.5	Mid Term-1, Quiz & End Sem Exam
35	Interface Electronic Circuit for Smart Sensors and Challenges for Interfacing the Smart Sensor	Lecture	CSI 201.5	Mid Term-1, Quiz & End Sem Exam
36	Usefulness of Silicon Technology in Smart Sensor And Future scope of research in smart sensor.	Lecture	CSI 201.5	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

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														SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSI 201.1	Understand the environmental parameters for IoT													1		
CSI 201.2	Applythe sensors for various applications of IoT	2		1	1									2		
CSI 201.3	Understand the concepts of fractional order element.													1		
CSI 201.4	Demonstrate the architecture for various sensors	1		1										1		
CSI 201.5	Evaluate various smart sensors for real world applications	2	2	2	2	2								2		

S. No.	Enrollment.No.	Student's Name	**CSI201** IOT SENSORS AND DEVICES							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U3G3
1	A60205223067	Mr DEVANSH SHRIVASTAVA	100	30	70	A	9	3	3	27
2	A60205223119	Mr ABHINAV LODHI	100	30	70	B+	7	3	3	21
3	A60205223134	Mr SHUBHAM MISHRA	100	30	70	B+	7	3	3	21

Average Grade Point = 23/3 (Total Grade point/Total no of students) = 7.66
No of students getting greater than average(7.66) marks = 1 students = 33.3%

Total No. of Students	=	3
Level 1	>50% average marks and <	33.3%

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	60% average marks	
Attainment Level		Level 1

Level 1	< 50% Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course: PROBLEM SOLVING THROUGH AI & ML
Course Code : **CSA 601**, Crédits : 03, Session :2023-234Even Sem.), Class : B.Tech. 3rdYear
Faculty Name: Ms. Anshita Shukla

A. **Introduction:** The main objective is to teach utility of basic methods of Artificial Intelligence and Machine learning in various case studies in industries, including:, planning, search, localization of errors, tracking, prediction and control of the system.

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

CSA601.1. Understand the informed and uninformed problem types and apply search strategies to solve them.

CSA601.2. Apply difficult real life problems in a state space representation so as to solve them using AI techniques like searching and game playing.

CSA601.3. Design and evaluate intelligent expert models for perception and prediction from intelligent environment.

CSA601.4. Formulate valid solutions for problems involving uncertain inputs or outcomes by using decision making techniques.

CSA601.5. Demonstrate and enrich knowledge to select and apply AI tools to synthesize information and develop models within constraints of application area.

C. **Program Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the profes

PO7. ial engineering solutio , and need for sustair

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PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. 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.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Program Specific Outcomes:

PSO1. Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur and a zest for higher studies.

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	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%
Total			**100%**

F. Syllabus

Module I: Int
Machine Lea
Hospitality

Manufacturing,

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Module II: Churn Analysis and Fraud Detection:
Churn Analysis and Prediction (Survival Modelling): Churn Prediction, Credit card Fraud Analysis: Imbalanced Data, Neural Network

Module III: Handling Text Data:
Handling Text Data, Bag-of-words, Regular Expressions, Sentence Splitting and Tokenization, Punctuations and Stop words, Incorrect spellings, Properties of words and Word cloud, Sentiment Analysis (Case Study)

Module IV: Forecasting and Prediction:
Forecasting models, Trend analysis, Cyclical and Seasonal analysis, Smoothing; Moving averages; Box-Jenkins, Holt-winters, Auto-correlation; ARIMA, Examples: Applications of Time Series in financial markets

Module V: Recommender Systems:
Recommendation Systems and Collaborative filtering, User based, Item Based, Singular value decomposition–based recommenders, Customer Segmentation and Value, Social Networking Analysis

Text & References:
Text:

- Machine Learning by Saikat Dutt , Subramanian Chandramouli, Pearson Education; First edition (1 October 2018)
- Chandra S.S.V, Artificial Intelligence and Machine Learning, Prentice Hall India Learning Private Limited; 1 edition (2014)

References:

- Tom M. Mitchell, ―Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.
- Ethem Alpaydin, ―Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004.
- Stephen Marsland, ―Machine Learning: An Algorithmic Perspective, CRC Press, 2009.
- Christopher M. Bishop, Pattern Recognition and Machine Learning.

G. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Machine Learning Applications across Industries	Lecture	CSA601.1	Mid Term-1& End Sem Exam
2	- Healthcare, Retail, Financial Services,	Lecture	CSA601.1	Mid Term-1 & End Sem Exam
3	Manufacturing, Hospitality	Lecture	CSA601.1	Mid Term-1 & End Sem Exam
4	Churn Analysis and Prediction (Survival Modelling):	Lecture	CSA601.1	Mid Term-1 &End Sem Exam
5				Mid Term-1 & End Sem

				Exam
6	Churn Prediction	Lecture	CSA601.1	Mid Term-1 & End Sem Exam
7	, Credit card Fraud Analysis:	Lecture	CSA601.1	Mid Term-1 & End Sem Exam
8	Credit card Fraud Analysis:	Lecture	CSA601.2	Mid Term-1& End Sem Exam
9	Imbalanced Data,	Lecture	CSA601.2	Mid Term-1 & End Sem Exam
10	Neural Network	Lecture	CSA601.2	Mid Term-1 & End Sem Exam
11	Neural Network	Lecture	CSA601.2	Mid Term-1& End Sem Exam
12	Handling Text Data,	Lecture	CSA601.2	Mid Term-1& End Sem Exam
13	Bag-of-words,	Lecture	CSA601.2	Mid Term-1 & End Sem Exam
14	Regular Expressions,	Lecture	CSA601.2	Mid Term-1 & End Sem Exam
15	Sentence Splitting and Tokenization,	Lecture	CSA601.3	Mid Term-1 & End Sem Exam
16	Punctuations and Stop words,	Lecture	CSA601.3	Mid Term-1& End Sem Exam
17	Incorrect spellings,	Lecture	CSA601.3	Mid Term-1 & End Sem Exam
18	Properties of words and Word cloud,	Lecture	CSA601.3	Mid Term-1 & End Sem Exam
19				Mid Term-1 & End Sem Exam

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20	Forecasting models,	Lecture	CSA601.3	Mid Term-1 & End Sem Exam
21	Trend analysis,	Lecture	CSA601.3	Mid Term-1& End Sem Exam
22	Cyclical and Seasonal analysis,	Lecture	CSA601.4	Mid Term-1& End Sem Exam
23	Smoothing;	Lecture	CSA601.4	Mid Term-1& End Sem Exam
24	Moving averages;	Lecture	CSA601.4	Mid Term-1& End Sem Exam
25	Box-Jenkins,	Lecture	CSA601.4	Quiz & End Sem Exam
26	Holt-winters,	Lecture	CSA601.4	Quiz & End Sem Exam
27	Auto-correlation;	Lecture	CSA601.4	Quiz & End Sem Exam
28	ARIMA,	Lecture	CSA601.4	Quiz & End Sem Exam
29	Examples: Applications of Time Series in financial markets	Lecture	CSA601.5	Quiz & End Sem Exam
30	Examples: Applications of Time Series in financial markets	Lecture	CSA601.5	Quiz & End Sem Exam
31	Recommendation Systems and Collaborative filtering,	Lecture	CSA601.5	Quiz & End Sem Exam
32	Recommendation Systems and Collaborative filtering,	Lecture	CSA601.5	Quiz & End Sem Exam
33	User based, Item Based,	Lecture	CSA601.5	Quiz & End Sem Exam
34	Singular value decomposition–based recommenders,	Lecture	CSA601.5	Quiz & End Sem Exam
35	Customer Segmentation and Value,	Lecture	CSA601.5	Quiz & End Sem Exam
36				Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSA601.1	Understand the informed and uninformed problem types and apply search strategies to solve them.															
CSA601.2	Apply difficult real life problems in a state space representation so as to solve them using AI techniques like searching and game playing.	2														
CSA601.3	Design and evaluate intelligent expert models for perception and prediction from intelligent environment.	2		1										1		
CSA601.4	Formulate valid solutions for problems involving uncertain inputs or outcomes by using decision making		2													
CSA601.5																

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	AI tools to synthesize information and develop models within constraints of application area.														

ATTAINMENT

B. Tech Sem 6th CSA 601 Problem Solving Through AI&ML

Enrollment.No.	Student's Name	CSA601							
		Problem Solving Through AI&ML							
		Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U6G6
A60205221001	Mr MARAMREDDY ASHISH KUMAR REDDY	100	30	70	B	6	3	3	18
A60205221013	Ms PEARL BANSAL	100	30	70	B	6	3	3	18
A60205221005	Mr ANURAG SINGH RANA	100	30	70	B+	7	3	3	21
A60205221004	Mr VISHAL KUMAR	100	30	70	B	6	3	3	18
A60205221016	Mr HARSHIT SHARMA	100	30	70	B+	7	3	3	21
A60205221031	Ms MANYATA SINGH	100	30	70	B+	7	3	3	21
A60205221011	Ms ANDREA NARCIS	100	30	70	B+	7	3	3	21
A60205221018	Mr SAHIL KHAN	100	30	70	B-	5	3	3	15
A60205221022	Mr SANSKAR SONI	100	30	70	B+	7	3	3	21
A6020522102									0

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A60205221041	Mr ARYAN SINGH TOMAR	100	30	70	B	6	3	3	18
A60205221025	Mr YASH SHARMA	100	30	70	A-	8	3	3	24
A60205221033	Mr SANDEEP SHARMA	100	30	70	B-	5	3	3	15
A60205221024	Ms MEGHNA GUPTA	100	30	70	A-	8	3	3	24
A60205221029	Mr PRIYANSHU KUMAR	100	30	70	A-	8	3	3	24
A60205221034	Mr TARUN SINGH TOMAR	100	30	70	F	0	3	0	0
A60205221026	Ms PRAGYA GUPTA	100	30	70	A	9	3	3	27
A60205221071	Ms SWATI GUPTA	100	30	70	B+	7	3	3	21
A60205221051	Ms SIMRAN SINGH	100	30	70	A	9	3	3	27
A60205221027	Mr MIRIYAM HEMANTH KUMAR	100	30	70	B+	7	3	3	21
A60205221057	Mr ANUSH M K	100	30	70	A	9	3	3	27
A60205221047	Ms KARTIKA CHAUHAN	100	30	70	A-	8	3	3	24
A60205221036	Mr DEEPENDRA SHARMA	100	30	70	B+	7	3	3	21
A60205221061	Ms VANDANA	100	30	70	A-	8	3	3	24
A60205221038	Mr DEVANSH VERMA	100	30	70	B+	7	3	3	21
A60205221081	Mr HARSHAVARDHAN CHEVADABOINA	100	30	70	B	6	3	3	18
A60205221066	Ms KRATI GOYAL	100	30	70	A-	8	3	3	24
A60205221042	Mr AYUSH TOMAR	100	30	70	B+	7	3	3	21
A6020522105	Mr HIMANSHU								24
A6020522109									21

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	KUSHWAH								
A60205221077	Mr AYUSH SHARMA	100	30	70	A-	8	3	3	24
A60205221053	Ms SHRUTI AGARWAL	100	30	70	A	9	3	3	27
A60205221068	Mr AYUSH SHARMA	100	30	70	B	6	3	3	18
A60205221058	Mr AKSHAT SHRIVASTAVA	100	30	70	A	9	3	3	27
A60205221076	Mr MORUBOYINA VENKATA SAI AKHIL	100	30	70	B+	7	3	3	21
A60205221056	Mr YUVRAJ SINGH PARIHAR	100	30	70	B-	5	3	3	15
A60205221091	Ms NIKHAT FATIMA	100	30	70	A	9	3	3	27
A60205221064	Ms SHATAKSHI SHARMA	100	30	70	A-	8	3	3	24
A60205221074	Mr PRIYANSHU TANGAR	100	30	70	A-	8	3	3	24
A60205221079	Mr MOKSH TIWARI	100	30	70	B+	7	3	3	21
A60205221082	Mr HRISHI SHARMA	100	30	70	B+	7	3	3	21
A60205221085	Ms PURVI GUPTA	100	30	70	B+	7	3	3	21
A60205221094	Mr SURAJ SINGH TOMAR	100	30	70	A-	8	3	3	24
A60205221095	Mr KONJETI MOHAN SAI AKHIL	100	30	70	B+	7	3	3	21
A60205221087	Ms VANSHIKA SISODIYA	100	30	70	A+	10	3	3	30
A60205221089	Mr SANDEEP YADAV	100	30	70	A-	8	3	3	24
A6020522108[illegible]	Mr JAIDEEP SHARMA	100	30	70	B+	7	3	3	21

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Average Grade Point = 331/48 (Total Grade point/Total no of students) = 6.8

No of students getting greater than average (6.8) marks = 36 students = 75%

Total No. of Students	**=**	**48**
Level 3	> 60% Average marks	**75**
Attainment Level		**Level 3**

Note: Attainment Level

Level 1	<50% - Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course: PROBLEM SOLVING THROUGH AI & ML LAB
Course Code : **CSA 621**, Crédits : 01, Session :2022-23(Even Sem.), Class : B.Tech. 3rd Year
Faculty Name:

A. **Introduction:** To expose students to Industrial approaches using machine learning techniques.

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

CSA621.1. Understand the informed and uninformed problem types and apply search strategies to solve them.

CSA621.2. Apply various pre-processing techniques on different datasets.

CSA621.3. Construct Machine learning programs for Supervised, Unsupervised and Semi supervised learning models.

CSA621.4. Develop Deep learning programs for Supervised & Unsupervised learning models.

CSA621.5. Identify and Apply Artificial Intelligence concepts to solve real world problems.

C. **Program Outcomes:**

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms

PO9. I mber or leader in dive

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PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. 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.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Program Specific Outcomes:

PSO1. Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur and a zest for higher studies.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term Viva	CT	15%
	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%
Total			**100%**

F. List of experiments/demonstrations

1. Churn Analysis
2. Credit Card Fraud Detection
3. Sentiment Analysis
4. Recommendation Systems
5. Customer Segmentation
6. Portfolio Optimization
7. Social Network Analysis
8. Uber Routing
9. Anom
10. Invent
11. Patien

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G. Examination Scheme:

IA			EE			
A	PR	Practical Based Test	Major Experiment	Minor Experiment	LR	Viva
5	10	15	35	15	10	10

Note: IA- Internal Assessment, EE- External Exam, A-Attendance, PR- Performance, LR- Lab Record, V-Viva.

Text & References:

Text:

- Machine Learning by Saikat Dutt , Subramanian Chandramouli, Pearson Education; First edition (1 October 2018)
- Chandra S.S.V, Artificial Intelligence and Machine Learning, Prentice Hall India Learning Private Limited; 1 edition (2014)

References:

- Tom M. Mitchell, ―Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.
- Ethem Alpaydin, ―Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004.
- Stephen Marsland, ―Machine Learning: An Algorithmic Perspective, CRC Press, 2009.
- Christopher M. Bishop, Pattern Recognition and Machine Learning.

H. Lab Plan

Practical	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Churn Analysis	Practical	CSA621.1	Mid Term-1, Quiz & End Sem Exam
2	Credit Card Fraud Detection	Practical	CSA621.1	Mid Term-1, Quiz & End Sem Exam
3	Sentiment Analysis	Practical	CSA621.2	Mid Term-1, Quiz & End Sem Exam
4	Recommendation Systems	Practical	CSA621.2	Mid Term-1, Quiz & End Sem Exam
5				Mid Term-1,

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				Quiz & End Sem Exam
6	Portfolio Optimization	Practical	CSA621.3	Mid Term-1, Quiz & End Sem Exam
7	Social Network Analysis	Practical	CSA621.3	Mid Term-1, Quiz & End Sem Exam
8	Uber Routing	Practical	CSA621.4	Mid Term-1, Quiz & End Sem Exam
9	Anomaly Detection	Practical	CSA621.4	Mid Term-1, Quiz & End Sem Exam
10	Inventory Optimization	Practical	CSA621.5	Mid Term-1, Quiz & End Sem Exam
11	Patient Diagnosis	Practical	CSA621.5	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		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSA621.1	Understand the informed and uninformed problem types and apply search strategies to solve them.															

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CSA621.2	Apply various pre-processing techniques on different datasets.	2														
CSA621.3	Construct Machine learning programs for Supervised, Unsupervised and Semi supervised learning models.			2										1		
CSA621.4	Develop Deep learning programs for Supervised & Unsupervised learning models.			2										1		
CSA621.5	Identify and Apply Artificial Intelligence concepts to solve real world problems.	2														

ATTAINMENT

B. Tech Sem 6th CSA 601 Problem Solving Through AI&ML

S.No.	Enrollment.No.	Student's Name	CSA 621 Problem Solving Through AI&ML Lab							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U7G7
1	A6020	Mr MARAMREDDY ASHISH KUMAR							1	7
2	A6020								1	7

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3	A60205221005	Mr ANURAG SINGH RANA	100	30	70	A-	8	1	1	8
4	A60205221004	Mr VISHAL KUMAR	100	30	70	B+	7	1	1	7
5	A60205221016	Mr HARSHIT SHARMA	100	30	70	B+	7	1	1	7
6	A60205221031	Ms MANYATA SINGH	100	30	70	A	9	1	1	9
7	A60205221011	Ms ANDREA NARCIS	100	30	70	A-	8	1	1	8
8	A60205221018	Mr SAHIL KHAN	100	30	70	B	6	1	1	6
9	A60205221022	Mr SANSKAR SONI	100	30	70	B+	7	1	1	7
10	A60205221021	Mr DHARMENDRA DIWAKAR	100	30	70	DE	0	1	0	0
11	A60205221041	Mr ARYAN SINGH TOMAR	100	30	70	B-	5	1	1	5
12	A60205221025	Mr YASH SHARMA	100	30	70	A	9	1	1	9
13	A60205221033	Mr SANDEEP SHARMA	100	30	70	A-	8	1	1	8
14	A60205221024	Ms MEGHNA GUPTA	100	30	70	A-	8	1	1	8
15	A60205221029	Mr PRIYANSHU KUMAR	100	30	70	A-	8	1	1	8
16	A60205221034	Mr TARUN SINGH TOMAR	100	30	70	B	6	1	1	6
17	A60205221026	Ms PRAGYA GUPTA	100	30	70	A	9	1	1	9
18	A60205221071	Ms SWATI GUPTA	100	30	70	B+	7	1	1	7
19	A60205221027	Ms SIMRAN SINGH	100	30	70	A	9	1	1	9
20	A60205221057	Mr MIRIYAM HEMANTH KUMAR	100	30	70	A-	8	1	1	8
21	A60205221047	Mr ANUSH M K	100	30	70	A	9	1	1	9
22	A6020								1	8

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23	A60205221061	Mr DEEPENDRA SHARMA	100	30	70	B+	7	1	1	7
24	A60205221038	Ms VANDANA	100	30	70	A	9	1	1	9
25	A60205221081	Mr DEVANSH VERMA	100	30	70	A-	8	1	1	8
26	A60205221066	Mr HARSHAVARDHAN CHEVADABOINA	100	30	70	B-	5	1	1	5
27	A60205221042	Ms KRATI GOYAL	100	30	70	B+	7	1	1	7
28	A60205221059	Mr AYUSH TOMAR	100	30	70	A-	8	1	1	8
29	A60205221054	Mr HIMANSHU SINGH	100	30	70	A-	8	1	1	8
30	A60205221099	Mr MANAV PRATAP SINGH TOMAR	100	30	70	B	6	1	1	6
31	A60205221077	Mr BADAL KUSHWAH	100	30	70	A-	8	1	1	8
32	A60205221053	Mr AYUSH SHARMA	100	30	70	B	6	1	1	6
33	A60205221068	Ms SHRUTI AGARWAL	100	30	70	A	9	1	1	9
34	A60205221058	Mr AYUSH SHARMA	100	30	70	A-	8	1	1	8
35	A60205221076	Mr AKSHAT SHRIVASTAVA	100	30	70	A	9	1	1	9
36	A60205221056	Mr MORUBOYINA VENKATA SAI AKHIL	100	30	70	B+	7	1	1	7
37	A60205221091	Mr YUVRAJ SINGH PARIHAR	100	30	70	B	6	1	1	6
38	A60205221064	Ms NIKHAT FATIMA	100	30	70	A	9	1	1	9
39	A60205221074	Ms SHATAKSHI SHARMA	100	30	70	A	9	1	1	9
41	A6020								1	9

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42	A60205221082	Mr MOKSH TIWARI	100	30	70	A-	8	1	1	8
43	A60205221085	Mr HRISHI SHARMA	100	30	70	B-	5	1	1	5
44	A60205221095	Mr SURAJ SINGH TOMAR	100	30	70	A-	8	1	1	8
45	A60205221087	Mr KONJETI MOHAN SAI AKHIL	100	30	70	B	6	1	1	6
46	A60205221092	Mr JAIDEEP SHARMA	100	30	70	DE	0	1	0	0
47	A60205221089	Ms VANSHIKA SISODIYA	100	30	70	A	9	1	1	9
48	A60205221086	Mr SANDEEP YADAV	100	30	70	A-	8	1	1	8

Average Grade Point =342 /48 (Total Grade point/Total no of students) = 7.1

No of students getting greater than average (7.1) marks = 28 students = 58%

Total No. of Students	=	**48**
Level 2	>50% Average marks	**58**
Attainment Level		**Level 2**

Note: Attainment Level

Level 1	<50% - Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course: WEB DESIGN & DEVELOPMENT
Course Code : BCA 202, Crédits : 03, Session :2023-24(Even Sem.), Class : BSc IT 1st year
Faculty Name: Dr. Chandrashekhar Goswami

A. **Introduction:** To impart the design, development and implementation of Dynamic Web Pages and develop programs for Web using Scripting Languages and give an introduction to Data Interchange formats in Web.

B. **Course Outcomes:** At the end of the course, students will be able to:
BCA202.1. Understand different components in web technology and know about CGI and CMS.
BCA202.2 Develop interactive Web pages using HTML/XHTML.
BCA202.3. Present a professional document using Cascaded Style Sheets.
***BCA202*.4**. Construct websites for user interactions using JavaScript.
***BCA202*.5**. Develop Web applications using JQuery.

C. **Programme Outcomes:**
[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identity, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis, and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
[PO.6]. **The engineer and society**: Apply to reason informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8] nsibilities and norms

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[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's work, as a member and leaderin a team, to manage projects and in multidisciplinary environments

[PO.12]. **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

D. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur and a zest for higher studies.

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	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a studentto 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%
Total			**100%**

F. Syllabus

Module I: In

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Origins and Evolution of HTML and XHTML, Basic Syntax of HTML, Standard HTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists, Tables, Forms, HTML5, Syntactic Differences between HTML and XHTML.

Module II: Introduction to Styles sheets and Frameworks Cascading Style Sheets: (5 Hours)

Levels of Style Sheets - Style Specification Formats, Selector Forms, Property-Value Forms, Font Properties, List Properties, Alignment of Text, Color, The Box Model, Background Images, The span, and div Tags. Frameworks: Overview and Basics of Responsive CSS Frameworks - Bootstrap.

Module III: JavaScript - I: (9 Hours)

Overview of JavaScript, Object Orientation and JavaScript, General Syntactic Characteristics Primitives, Operations, and Expressions, Screen Output and Keyboard Input, Control Statements, Arrays, Functions. Callback Functions, JavaScript Objects: The JavaScript Object Model and Hierarchy, Fundamental JavaScript Directives: In-Line JavaScript, Linking Web Pages to External JavaScript Files, JavaScript Using <script> Tags and Attributes, Utilizing the <head> Tags <noscript> Tags.

Module IV: JavaScript - II: (10 Hours)

Introduction to Server-Side JavaScript, Purpose of Server-Side JavaScript, ASP and Microsoft Server Architecture, Netscape's Livewire Run-Time Engine, Server-Side Objects; Cookies: Introduction to Cookie, Uses of Cookie, Components of a Cookie, Cookie Controversy, Using Cookies on a Web Page, Cookie Examples; Common Applications: Form Validation and Testing, Specific Form Methods and Event Handlers, User Interaction, Local Form Processing, Creating New Windows, Writing to the Window Object, Browser Awareness Using the Navigator Object, Affecting the Browser Itself, Interactive Graphics; Event Handling: Event-Driven Programming Model, How JavaScript Handles Events, Handling Link Events, Handling Window Events, Handling Image Events, Handling Form Events, Setting Event Handlers In-Line or Referencing.

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:

- P. J. Deitel, H.M. Deitel, Internet &World Wide Web How To Program, 4/e, Pearson International Edition 2010.
- Robert W Sebesta, Programming the World Wide Web, 7/e, Pearson Education Inc., 2014.
- Bear Bibeault and Yehuda Katz, jQuery in Action, Second Edition, Manning Publications. [Chapter 1] Black Book, Kogent Learning Solutions Inc. 2009.
- Bob Boiko, Content Management Bible, 2nd Edition, Wiley Publishers. [Chapter 1, 2]
- Chris Bates, Web Programming Building Internet Applications, 3/e, Wiley India Edition 2009.
- Dream Tech, Web Technologies: HTML, JS, PHP, Java, JSP, ASP.NET, XML, AJAX,
- Jeffrey C Jackson, Web Technologies A Computer Science Perspective, Pearson Education Inc. 2009.
- Lindsay Bassett, Introduction to JavaScript Object Notation: A To-the-Point Guide to JSON 1st Edition, O'Reilly. [Chapter 1,2,3,4] 7.
- Matth

H. Lectu

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Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Basic Syntax of HTML, Standard HTML Document Structure	Lecture	BCA202.1	Mid Term-1, Quiz & End Sem Exam
2	Basic Text Markup, Images	Lecture	BCA202.1	Mid Term-1, Quiz & End Sem Exam
3	Hypertext Links	Lecture	BCA202.1	Mid Term-1, Quiz & End Sem Exam
4	Lists, Tables	Lecture	BCA202.1	Mid Term-1, Quiz & End Sem Exam
5	Forms, HTML5	Lecture	BCA202.1	Mid Term-1, Quiz & End Sem Exam
6	Syntactic Differences between HTML and XHTML	Lecture	BCA202.1	Mid Term-1, Quiz & End Sem Exam
7	Levels of Style Sheets - Style Specification Formats, Selector Forms	Lecture	BCA202.2	Mid Term-1, Quiz & End Sem Exam
8	Levels of Style Sheets - Style Specification Formats, Selector Forms	Lecture	BCA202.2	Mid Term-1, Quiz & End Sem Exam
9	Property-Value Forms, Font Properties, List Properties, Alignment of Text, Color,	Lecture	BCA202.2	Mid Term-1, Quiz & End Sem Exam
10	The Box Model, Background Images, The span, and div Tags.	Lecture	BCA202.2	Mid Term-1, Quiz & End Sem Exam
11	Frameworks: Overview and Basics of Responsive CSS Frameworks - Bootstrap.	Lecture	BCA202.2	Mid Term-1, Quiz & End Sem Exam
12	Practical Examples	Lecture	BCA202.2	Mid Term-1, Quiz & End Sem Exam
13	Overview of JavaScript, Object Orientation and JavaScript	Lecture	BCA202.3	Mid Term-1, Quiz & End Sem Exam
14	General Syntactic Characteristics Primitives, Operations, and Expressions	Lecture	BCA202.3	Mid Term-1, Quiz & End Sem Exam
15	Screen Output and Keyboard Input, Control Statements	Lecture	BCA202.3	Mid Term-1, Quiz & End Sem Exam
16	Arrays, Functions. Callback Functions	Lecture	BCA202.3	Mid Term-1, Quiz & End Sem Exam
17	JavaScript Objects: The JavaScript Object Model and Hierarchy	Lecture	BCA202.3	Mid Term-1, Quiz & End Sem Exam
18	Fundamental JavaScript Directives	Lecture	BCA202.3	Mid Term-1, Quiz & End Sem Exam
19				erm-1, Quiz Sem Exam
20				erm-1, Quiz

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	Tags and Attributes			& End Sem Exam
21	Utilizing the <head> Tags <noscript> Tags	Lecture	BCA202.3	Mid Term-2, Quiz & End Sem Exam
22	Practical Examples	Lecture	BCA202.3	Mid Term-2, Quiz & End Sem Exam
23	Introduction to Server-Side JavaScript, Purpose of Server-Side JavaScript	Lecture	BCA202.4	Mid Term-2, Quiz & End Sem Exam
24	ASP and Microsoft Server Architecture, Netscape's Livewire Run-Time Engine	Lecture	BCA202.4	Mid Term-2, Quiz & End Sem Exam
25	Server-Side Objects; Cookies	Lecture	BCA202.4	Mid Term-2, Quiz & End Sem Exam
26	Introduction to Cookie, Uses of Cookie	Lecture	BCA202.4	Mid Term-2, Quiz & End Sem Exam
27	Components of a Cookie, Cookie Controversy, Using Cookies on a Web Page, Cookie Examples	Lecture	BCA202.4	Mid Term-2, Quiz & End Sem Exam
28	Common Applications: Form Validation and Testing, Specific Form Methods and Event Handlers	Lecture	BCA202.5	Mid Term-2, Quiz & End Sem Exam
29	User Interaction, Local Form Processing, Creating New Windows	Lecture	BCA202.5	Mid Term-2, Quiz & End Sem Exam
30	Writing to the Window Object, Browser Awareness Using the Navigator Object, Affecting the Browser Itself	Lecture	BCA202.5	Mid Term-2, Quiz & End Sem Exam
31	Interactive Graphics; Event Handling: Event-Driven Programming Model	Lecture	BCA202.5	Mid Term-2, Quiz & End Sem Exam
32	How JavaScript Handles Events, Handling Link Events	Lecture	BCA202.5	Mid Term-2, Quiz & End Sem Exam
33	Handling Window Events, Handling Image Events	Lecture	BCA202.5	Mid Term-2, Quiz & End Sem Exam
34	Handling Form Events, Setting Event Handlers In-Line or Referencing	Lecture	BCA202.5	Mid Term-2, Quiz & End Sem Exam
35	Practical Examples	Lecture	BCA202.5	Mid Term-2, Quiz & End Sem Exam
36	Practical Examples	Lecture	BCA202.5	Mid Term-2, Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME	CORRELATION

AMME-
IC
OMES

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BCA202.1	Understand different components in web technology and know about CGI and CMS.	3	3	1	3	1										
BCA202.2	Develop interactive Web pages using HTML/XHTML.	3	2	2	2	2										
BCA202.3	Present a professional document using Cascaded Style Sheets.	3	2	2	2	2										
BCA202.4	Construct websites for user interactions using JavaScript.	3	3	2	3	2										
BCA202.5	Develop Web applications using JQuery.	3	3	2	3	2										

ATTAINMENT

ESE Marks – BCA202 , WEB TECHNOLOGIES

BCA202
WEB DESIGN & DEVELOPMENT

			CE	ET						
o.	Enrollment.No.	Student's Name	Weight Age (%)	Weight Age (%)	GO	GP	ACU	ECU	U7G7	Max Marks
	A60204923002	Ms IS								100
	A60204923003	Ms HA								100

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Average Grade Point = 11/2 (Total Grade point/Total no of students) = 5.5

No of students getting greater than average (5.5) marks = 1 students = 50%

Total No. of Students	**=**	**2**
Level 2	>50% Average marks	**50**
Attainment Level		**Level 2**

Note: Attainment Level

Level 1	<50% - Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course: WEB DESIGN & DEVELOPMENT LAB
Course Code : **BCA 222** Crédits : 01, Session :2023-24(Even Sem.), Class : BSc IT 1st year
Faculty Name: Dr. Chandrashekhar Goswami

A. **Introduction:** The objective of the course is to teach students the details of web designing and development techniques. This course help students to develop web sites and web applications. The objective of this lab is to develop an ability to design and implement static and dynamic website.

B. **Course Outcomes:** At the end of the course, students will be able to:
BCA222.1. Design and implement dynamic websites with a good aesthetic sense of designing and the latest technical know-how.
BCA222.2. Understand the concepts of Web Application Terminologies, Internet Tools, E-Commerce, and other web services.
BCA222.3. Implement the concept of Online Game programming.
BCA222.4. Construct websites for user interactions using JavaScript.
BCA222.5. Develop Web applications using JQuery.

C. **Programme Outcomes:**
[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

[PO.2]. **Problem analysis**: Identity, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and the cultural, societal, and environmental considerations.

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis, and interpretation of data, and synthesis of the information to provide valid conclusions.

[PO.5].**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
[PO.6]. **The engineer and society**: Apply to reason informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice.

[PO.7] il engineering solutic and need for sustair

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[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices.

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and multidisciplinary settings.

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

[PO.11].**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

[PO.12].**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 to technological change.

D. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur and a zest for higher studies.

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	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

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F. Syllabus

Lab-Experiments should include but not be limited to:

1. Write an HTML code to display your education details in a tabular format.
2. Write an HTML code to display your CV on a web page.
3. Write an HTML code to create a Home page having three links: About Us, Our Services and Contact Us. Create separate web pages for the three links.
4. Write JavaScript to demonstrate the use of different dialogue boxes. For example: write massages good morning, good bye etc, take value from alert, confirmation for any operation.
5. Write a JavaScript program to find factorial of a number.
6. Write a JavaScript program to find square and cube of number using function.
7. Write a JavaScript program to validate a form which consist of name, Age, address, email id, hobby(checkbox), gender(radio button), country (dropdown)
8. Create one form in which username must be 10 characters long, last name must be 5 characters long, validate email address and also validate for nonempty (fields must not be blank) fields.
9. Create JavaScript program which have list of color in drop down menu, if user can select any color from drop down menu this color will set to the background of document.
10. Create JavaScript program to create mathematical calculator.(functionality-+,*,-,/)
11. Write a JavaScript program which displays an alert message on Mouse Over Event of an Image.
12. Write a JavaScript program to change text from Uppercase toLowercase.
13. Display a clock using Date object.
14. Sort N integer using Array object.
15. Display Key name on a key pressed using Event object.
16. Write a JavaScript code which return today's date including date and Time.

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:

- P. J. Deitel, H.M. Deitel, Internet &World Wide Web How To Program, 4/e, Pearson International Edition 2010.
- Robert W Sebesta, Programming the World Wide Web, 7/e, Pearson Education Inc., 2014.
- Bear Bibeault and Yehuda Katz, jQuery in Action, Second Edition, Manning Publications. [Chapter 1] Black Book, Kogent Learning Solutions Inc. 2009.
- Bob Boiko, Content Management Bible, 2nd Edition, Wiley Publishers. [Chapter 1, 2]
- Chris Bates, Web Programming Building Internet Applications, 3/e, Wiley India Edition 2009.
- Dream Tech, Web Technologies: HTML, JS, PHP, Java, JSP, ASP.NET, XML, AJAX,
- Jeffrey C Jackson, Web Technologies A Computer Science Perspective, Pearson Education Inc. 2009.
- Lindsay Bassett, Introduction to JavaScript Object Notation: A To-the-Point Guide to JSON 1st Edition, O'Reilly. [Chapter 1,2,3,4] 7.
- Matthew MacDonald, WordPress: The Missing Manual, 2nd Edition, O'Reilly Media.

H. Lecture Plan

Lecture	Topics	Mode of	Corresponding CO	Mode of Assessing CO
1				rm-1, Quiz Sem Exam

	details in a tabular format.			
2	Write an HTML code to display your CV on a web page.	Practical	BCA222.1	Mid Term-1, Quiz & End Sem Exam
3	Write an HTML code to create a Home page having three links: About Us, Our Services and Contact Us. Create separate web pages for the three links.	Practical	BCA222.1	Mid Term-1, Quiz & End Sem Exam
4	Write JavaScript to demonstrate the use of different dialogue boxes. For example: write massages good morning, good bye etc, take value from alert, confirmation for any operation.:	Practical	BCA222.2	Mid Term-1, Quiz & End Sem Exam
5	Write a JavaScript program to find factorial of a number.	Practical	BCA222.2	Mid Term-1, Quiz & End Sem Exam
6	Write a JavaScript program to find square and cube of number using function.	Practical	BCA222.2	Mid Term-1, Quiz & End Sem Exam
7	Write a JavaScript program to validate a form which consist of name, Age, address, email id, hobby(checkbox), gender(radio button), country (dropdown)	Practical	BCA222.3	Mid Term-1, Quiz & End Sem Exam
8	Create one form in which username must be 10 characters long, last name must be 5 characters long, validate email address and also validate for nonempty (fields must not be blank) fields.	Practical	BCA222.3	Mid Term-1, Quiz & End Sem Exam
9	Create JavaScript program which have list of color in drop down menu, if user can select any color from drop down menu this color will set to the background of document.	Practical	BCA222.3	Mid Term-1, Quiz & End Sem Exam
10	Create JavaScript program to create mathematical calculator.(functionality-+,*,-,/)	Practical	BCA222.4	Mid Term-1, Quiz & End Sem Exam
11	Write a JavaScript program which displays an alert	Practical	BCA222.4	Mid Term-1, Quiz & End Sem Exam
12				rm-1, Quiz Sem Exam

	toLowercase.			
13	Display a clock using Date object.	Practical	BCA222.5	Mid Term-1, Quiz & End Sem Exam
14	Sort N integer using Array object.	Practical	BCA222.5	Mid Term-1, Quiz & End Sem Exam
15	Display Key name on a key pressed using Event object.	Practical	BCA222.5	Mid Term-1, Quiz & End Sem Exam
16	Write a JavaScript code which return today's date including date and Time.	Practical	BCA222.5	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		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BCA222.1	Design and implement dynamic websites with a good aesthetic sense of designing and the latest technical know-how.	3	3	1	3	1										
BCA222.2	Understand the concepts of Web Application Terminologies, Internet Tools, E-Commerce, and other web services.	3	2	2	2	2										
BCA222.3	Implement the concept of Online Game programming.	3	2	2	2	2										
BCA222.4	Construct websites for user interactions using	3	2	2	2	2										
BCA222.5																

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ATTAINMENT

ESE Marks – BCA222, WEB DESIGN & DEVELOPMENT LAB

BCA222							
WEB DESIGN & DEVELOPMENT LAB							
Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U13G13
100	30	70	DE	0	1	0	0
100	30	70	A	9	1	1	9

Average Grade Point = 9/2 (Total Grade point/Total no of students) = 4.5
No of students getting greater than average (4.5) marks = 1 students = 50%

Total No. of Students	=	**2**
Level 2	>50% Average marks	**50**
Attainment Level		**Level 2**

Note: Attainment Level

Level 1	<50% - Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : Data Warehousing and Mining
Course Code : BCA 603, Crédits : 03, Session : 2022-23 (Even Sem.), Class : BCA 3rd Year
Faculty Name : Dr. Chandrashekhar Goswami

A. **Introduction:** The student should be made to: Be familiar with the concepts of data warehouse and data mining, be acquainted with the tools and techniques used for Knowledge Discovery in Databases. Study data warehouse principles and its working learn data mining concepts understand association rules mining. Discuss classification algorithms learn how data is grouped using clustering techniques.

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

BCA603.1 Understand why the data warehouse required in addition to database systems.

BCA603.2 Apply data mining techniques and methods to large data sets.

BCA603.3 Use data mining tools to compare and contrast the various classifiers.

BCA603.4 Understand the association rules, classification and clusters in large data sets.

BCA603.5 Analyze real world problems in business and scientific information using data mining.

C. Programme Outcomes:

[PO1]. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

[**PO2]. Problem Analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

[**PO3]. Design/Development of Solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

[**PO4]. Conduct Investigations of Complex Problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

[**PO5]. Modern Tool Usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanc

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[**PO6]. The Engineer and Society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

[**PO7]. Environment and Sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

[**PO8]. Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

[**PO9]. Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

[**PO10]. Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

[**PO11]. 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.

[**PO12]. Project Management and Finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

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	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a studentto be qualified for taking up the End Semester examination. The allowance of 25% includes all	A	5%

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End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Data Warehousing: (4 Hours)

Introduction to Data Warehousing, The need for data warehousing, Operational & Informational Data Stores, Data Warehouse Characteristics, Data Warehouse role & Structure, The cost of warehousing data, Introduction to OLAP & OLTP, Difference between OLAP & OLTP, OLAP Operations.

Module II: Data Warehouse Building Blocks: (7 Hours)

Building a Data Warehouse, Design and Implementation Considerations, Data Preprocessing Overview, Data Summarization, Data Cleaning, Data Transformation, Concept, Hierarchy, Structure, Patterns & Models, Multidimensional Data Model, Schemas for Multidimensional Data (Star Schema, Snowflake Schema, Fact Constellation), Data Warehouse Architecture, Data Warehouse Design, OLAP Three-tier Architecture, Indexing & Querying in OLAP, OLAM, OLAP Server Architecture – ROLAP, MOLAP and HOLAP, Efficient Methods of Cube Computation, Discovery Driven Exploration of Data Cubes, Attributed-Oriented Induction.

Module III: Introducing to Data Mining: (6 Hours)

Introduction to Data Mining, Difference between operational database systems and data warehouses, Data warehouses Characteristics, Data warehouse Architecture and its Components, Extraction – Transformation – Loading, Logical (Multi – Dimensional), Data Modeling, Schema Design, Star and Snow – Flake Schema, Fact Consultation, Fact Table, Fully Addictive, Semi – Addictive, Non Addictive Measures; Fact – Less – Facts, Dimension Table Characteristics.

Module IV: Association Rules: (6 Hours)

Association Rules: problems Definition, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence Measures, Association Rule Mining, Market Basket Analysis, Association Rule Generation; APRIOIRI Algorithm, Association Rules, From Association Mining to Correlation Analysis, Constraint Based Association Mining, Compact Representation of Frequent Item set - Maximal Frequent Item Set, Closed Frequent Item Sets.

Module V: Classification and Clustering: (7 Hours)

Classification: Problem Definition, General Approaches to solving a classification problem, Evaluation of classifiers, Classification Techniques, Decision Tree – Decision tree Construction, Methods for Expressing attribute test conditions, Measures for Selecting the Best Split, Naive Bayes Classifier, Introduction to Prediction techniques, Accuracy of a Classifier, Introduction to Clustering, Classification of Various Clustering Algorithms, Selecting and Using Right DM Technique, Selecting and Using Right DM Technique, Data Visualization.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

Note: CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; A: Attendance

Text & References

Text:

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- Data Mining – Concepts and Techniques – Jiawei Han, Michelinen Kamber, Morgan Kaufmann Publishers, Elsevier.
- Introduction to Data Mining, Pang – Ning Tan, Vipin Kumar, Michael Steinbanch, Pearson Education.
- Alex Berson and Stephen J.Smith, "Data Warehousing, Data Mining and OLAP", Tata McGraw – Hill Edition.
- Data Warehousing, Data Mining, and OLAP, Alex Berson, First Edition, Tata McGraw
- Hill
- Data Mining Concepts & Techniques, Jiawei Han & Micheline Kamber, Second Edition,
- Morgan Kaufmann Publishers
- Modern Data Warehousing, Mining & Visualization Core Concepts, George M Marakas,
- First Edition, Pearson Education
- Data Warehousing, Architecture & Implementation, Hawkin, Prentice Hall
- Data Mining Techniques, Berry,Michael, Third Edition
- Data Mining, Data Warehousing and OLAP, Sharma, Gajendra, Second Edition
- Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.
- Data Warehouse Fundamentals, Pualraj Ponnaiah, Wiley Student Edition.
- Data Mining, Vikaram Pudi, P Radha Krishna, Oxford University Press

I. Lecture Plan

Lecture	*Topics*	*Mode of Delivery*	*Corresponding CO*	*Mode of Assessing CO*
1	Introduction to Data Warehousing, The need for data warehousing	Lecture	BCA603.1	Mid Term-1, Quiz & End Sem Exam
2	Operational & Informational Data Stores, Data Warehouse Characteristics	Lecture	BCA603.1	Mid Term-1, Quiz & End Sem Exam
3	Data Warehouse role & Structure, The cost of warehousing data	Lecture	BCA603.1	Mid Term-1, Quiz & End Sem Exam
4	Introduction to OLAP & OLTP	Lecture	BCA603.1	Mid Term-1, Quiz & End Sem Exam
5	Difference between OLAP & OLTP, OLAP Operations	Lecture	BCA603.1	Mid Term-1, Quiz & End Sem Exam
6	Building a Data Warehouse, Design and Implementation Considerations, Data Preprocessing Overview, Data Summarization	Lecture	BCA603.1	Mid Term-1, Quiz & End Sem Exam
7	Data Cleaning, Data Transformation, Concept, Hierarchy, Structure, Patterns & Models, Multidimensional Data Model	Lecture	BCA603.1	Mid Term-1, Quiz & End Sem Exam
8	Schemas for Multidimensional	Lecture	BCA603.2	Mid Term-1, Quiz m Exam

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9	Data Warehouse Design, OLAP Three-tier Architecture	Lecture	BCA603.2	Mid Term-1, Quiz & End Sem Exam
10	Indexing & Querying in OLAP, OLAM	Lecture	BCA603.2	Mid Term-1, Quiz & End Sem Exam
11	OLAP Server Architecture – ROLAP, MOLAP and HOLAP, Efficient Methods of Cube Computation	Lecture	BCA603.2	Mid Term-1, Quiz & End Sem Exam
12	Discovery Driven Exploration of Data Cubes, Attributed-Oriented Induction.	Lecture	BCA603.2	Mid Term-1, Quiz & End Sem Exam
13	Introduction to Data Mining, Difference between operational database systems and data warehouses, Data warehouses Characteristics	Lecture	BCA603.2	Mid Term-1, Quiz & End Sem Exam
14	Data warehouse Architecture and its Components, Extraction – Transformation – Loading	Lecture	BCA603.2	Mid Term-1, Quiz & End Sem Exam
15	Logical (Multi – Dimensional), Data Modeling, Schema Design	Lecture	BCA603.2	Mid Term-1, Quiz & End Sem Exam
16	Star and Snow – Flake Schema, Fact Consultation	Lecture	BCA603.2	Mid Term-1, Quiz & End Sem Exam
17	Fact Table, Fully Addictive, Semi – Addictive, Non Addictive Measures	Lecture	BCA603.2	Mid Term-1, Quiz & End Sem Exam
18	Fact – Less – Facts, Dimension Table Characteristics	Lecture	BCA603.2	Mid Term-1, Quiz & End Sem Exam
19	Association Rules: problems Definition, Frequent Item Set Generation	Lecture	BCA603.3	Mid Term-1, Quiz & End Sem Exam
20	The APRIORI Principle, Support and Confidence Measures	Lecture	BCA603.3	Mid Term-1, Quiz & End Sem Exam
21	Association Rule Mining, Market Basket Analysis	Lecture	BCA603.3	Mid Term-2, Quiz & End Sem Exam
22	Association Rule Generation; APRIOIRI Algorithm	Lecture	BCA603.3	Mid Term-2, Quiz & End Sem Exam

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23	Association Rules, From Association Mining to Correlation Analysis	Lecture	BCA603.3	Mid Term-2, Quiz & End Sem Exam
24	Constraint Based Association Mining	Lecture	BCA603.3	Mid Term-2, Quiz & End Sem Exam
25	Compact Representation of Frequent Item set - Maximal Frequent Item Set, Closed Frequent Item Sets.	Lecture	BCA603.4	Mid Term-2, Quiz & End Sem Exam
26	Classification: Problem Definition, General Approaches to solving a classification problem	Lecture	BCA603.4	Mid Term-2, Quiz & End Sem Exam
27	Evaluation of classifiers, Classification Techniques	Lecture	BCA603.4	Mid Term-2, Quiz & End Sem Exam
28	Decision Tree – Decision tree Construction	Lecture	BCA603.4	Mid Term-2, Quiz & End Sem Exam
29	Methods for Expressing attribute test conditions	Lecture	BCA603.4	Mid Term-2, Quiz & End Sem Exam
30	Measures for Selecting the Best Split	Lecture	BCA603.4	Mid Term-2, Quiz & End Sem Exam
31	Naive Bayes Classifier, Introduction to Prediction techniques	Lecture	BCA603.5	Mid Term-2, Quiz & End Sem Exam
32	Accuracy of a Classifier, Introduction to Clustering	Lecture	BCA603.5	Mid Term-2, Quiz & End Sem Exam
33	Classification of Various Clustering Algorithms	Lecture	BCA603.5	Mid Term-2, Quiz & End Sem Exam
34	Selecting and Using Right DM Technique	Lecture	BCA603.5	Mid Term-2, Quiz & End Sem Exam
35	Selecting and Using Right DM Technique	Lecture	BCA603.5	Mid Term-2, Quiz & End Sem Exam
36	Data Visualization	Lecture	BCA603.5	Mid Term-2, Quiz & End Sem Exam

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

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Course Articulation Matrix (Mapping of COs with POs) CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BCA603.1	Understand why the data warehouse required in addition to database systems.	1	2	1	3	2										
BCA603.2	Apply data mining techniques and methods to large data sets.	1	3	1	1	2										
BCA603.3	Use data mining tools to compare and contrast the various classifiers.	1	3	1	1	2										
BCA603.4	Understand the association rules, classification and clusters in large data sets.	2	3	2	1	2										
BCA603.5	Analyze real world problems in business and scientific information using data mining.	1	3	1	1	2										

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ATTAINMENT

			BCA603							
			DATA WAREHOUSING AND MINIING							
S.No.	Enrollment No.	Name	Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U10 G10
1	A60204821001	Ms ARYA NAIR	100	30	70	B+	7	3	3	21
2	A60204821002	Mr AYUSHMAN MISHRA	100	30	70	B+	7	3	3	21
3	A60204821003	Ms SHRADHA GUPTA	100	30	70	B+	7	3	3	21
4	A60204821004	Mr VINAYAK KATARA	100	30	70	B-	5	3	3	15
5	A60204821005	Mr ABHISHEK PANDEY	100	30	70	C+	4	3	3	12
6	A60204821006	Ms MANSI CHANDANI	100	30	70	B-	5	3	3	15
7	A60204821008	Mr ADITYA SHARMA	100	30	70	B	6	3	3	18
8	A60204821009	Mr ANUBHAV SHAKYA	100	30	70	B+	7	3	3	21
9	A60204821010	Mr DILIP KUMAR	100	30	70	B	6	3	3	18
10	A60204821012	Mr SHASHIKANT KESHARWANI	100	30	70	B-	5	3	3	15
11	A60204821015	Ms GARVITA SINGHAL	100	30	70	A+	10	3	3	30
12	A60204821017	Mr BALRAM SINGH TOMAR	100	30	70	B-	5	3	3	15
13	A60204821019	Ms NIKITA TOMAR	100	30	70	A	9	3	3	27
14	A60204821020	Mr SUJAL PAL	100	30	70	A-	8	3	3	24
15	A60204821021	Mr ANKIT KUMAR JHA	100	30	70	B	6	3	3	18
16	A60204821022	Mr PRAHLAD GAUR	100	30	70	B+	7	3	3	21
							104			

Average Grade Point = 104/16 (Total Grade point/Total no of students) = 6.5

No of students getting greater than average (6.5) marks = 8 students = 50%

Total No. of Students = 16

Level 2 (>50% average marks and < 60% average marks) **50%**

Attainment Level Level 2

Note: Attainment Level

Level 1	<50% - Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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AMITY UNIVERSITY

MADHYA PRADESH

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

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : ADVANCED Computer Networks
Course Code : MCA 202, Crédits : 03, Session :2022-23 (Even Sem.), Class : MCA 1st Year
Faculty Name : Dr.

A. **Introduction:** The course is designed for students who have basis knowledge of networking (OSI model, TCP/IP, ARP and few application level protocols, LAN and routing etc.). the course introduces advanced topics that are basis blocks of networking and covers fundamentals that are used to develop few of the advanced technologies, including routing protocols, wireless & mobile networks etc.

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

- **MCA202.1.** Understand the fundamental of computer Networks & OSI model.
- **MCA202.2**. Use the different communication protocols for data delivery at specified destination.
- **MCA202.3**. Apply the knowledge of routing algorithms to find shortest path.
- **MCA202.4**. Understand the concepts of Internet Protocols.
- **MCA202.5**. Understand the end to end delivery of data & error control mechanism at transport layer.

C. Programme Outcomes:

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5] , and modern

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engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **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

D. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**

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Continuous Internal Evaluation	Mid Term 1	CT	15%
	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%
Total			**100%**

F.

F. Syllabus

Module I:

Data Communication, Transmission Channel, Data Compression, Line Configurations, Signal Representation, Parallel and Serial Data Transmission, Asynchronous and Synchronous Modes of Data Transmission. Digital Signal Encoding, Channel Coding. Introduction to Computer Network and its uses, Layered Architecture and Network Standardization, OSI and TCP/IP Model and their Comparison, Critique of OSI and TCP/IP.

Module II:

Transmission media, Switching Methods, Digital interface standards: RS-232 standard, handshaking and its types. High-speed desktop serial interfaces. Remote digital transmission carrier ISDN, Packet data network, Digital access, Various communications between DTE & CTE with and without handshaking, Modulation and demodulation, modems and modem standards.

Module III:

ICMP Header, ICMP message types, ICMP timestamp request and reply, trace route, ping program, Intra & inter domain routing-distance vector routing, RIP, Link State Routing, OSPF, Path Vector Routing, BGP, Unicast Routing protocols, IGMP-IGMP message, operation, encapsulation

Module IV:

Routing Protocol Basics, Routing Information Protocol (RIP), Interior Gateway Routing Protocol (IGRP), Verifying Your Configurations Routing Techniques, Introduction to traffic Engineering, IP over ATM, Multiproto

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Module V:

Optical Networking, Introduction to Optical Networking, SONET / SDH Standard, DWDM, Packet Switching Protocols, Introduction to Packet Switching, Introduction to Virtual Circuit Packet Switching, Introduction to X.25, Introducing switched multimegabit data service

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:

- Computer Networks: A Systems Approach", by Larry Peterson and Bruce Davie.
- "Computer Networking: A Top-Down Approach Featuring the Internet", by James F. Kurose and Keith W. Ross
- Behrouz A. Forouzan; *Data Communications and Networking*, McGraw-Hill.
- Andrew S. Tanenbaum; *Computer Networks*; Pearson Prentice Hall.

H. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Data Communication, Transmission Channel	Lecture	MCA202.1	Mid Term-1, Quiz & End Sem Exam
2	Data Compression, Line Configurations	Lecture	MCA202.1	Mid Term-1, Quiz & End Sem Exam
3	Signal Representation, Parallel and Serial Data Transmission	Lecture	MCA202.1	Mid Term-1, Quiz & End Sem Exam

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4	Asynchronous and Synchronous Modes of Data Transmission	Lect ure	MCA2 02.1	Mid Term-1, Quiz & End Sem Exam
5	Digital Signal Encoding, Channel Coding	Lect ure	MCA2 02.1	Mid Term-1, Quiz & End Sem Exam
6	Introduction to Computer Network and its uses, Layered Architecture and Network Standardization	Lect ure	MCA2 02.1	Mid Term-1, Quiz & End Sem Exam
7	OSI and TCP/IP Model and their Comparison, Critique of OSI and TCP/IP	Lect ure	MCA2 02.1	Mid Term-1, Quiz & End Sem Exam
8	Transmission media, Switching Methods	Lect ure	MCA2 02.2	Mid Term-1, Quiz & End Sem Exam
9	Digital interface standards: RS-232 standard	Lect ure	MCA2 02.2	Mid Term-1, Quiz & End Sem Exam
10	handshaking and its types. High-speed desktop serial interfaces	Lect ure	MCA2 02.2	Mid Term-1, Quiz & End Sem Exam
11	Remote digital transmission carrier ISDN, Packet data network, Digital access	Lect ure	MCA2 02.2	Mid Term-1, Quiz & End Sem Exam
12	Various communications between DTE & CTE with and without handshaking	Lect ure	MCA2 02.2	Mid Term-1, Quiz & End Sem Exam
13	Modulation and demodulation	Lect ure	MCA2 02.2	Mid Term-1, Quiz & End Sem Exam
14	modems and modem standards	Lect ure	MCA2 02.2	Mid Term-1, Quiz & End Sem Exam
15	ICMP Header, ICMP message types	Lect ure	MCA2 02.3	Mid Term-1, Quiz & End Sem Exam

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16	ICMP timestamp request and reply	Lecture	MCA202.3	Mid Term-1, Quiz & End Sem Exam
17	trace route, ping program	Lecture	MCA202.3	Quiz & End Sem Exam
18	Intra & inter domain routing-distance vector routing	Lecture	MCA202.3	Quiz & End Sem Exam
19	RIP, Link State Routing	Lecture	MCA202.3	Quiz & End Sem Exam
20	OSPF, Path Vector Routing, BGP	Lecture	MCA202.3	Quiz & End Sem Exam
21	Unicast Routing protocols, IGMP-IGMP message, operation	Lecture	MCA202.3	Quiz & End Sem Exam
22	encapsulation	Lecture	MCA202.3	Quiz & End Sem Exam
23	Routing Protocol Basics, Routing Information Protocol (RIP)	Lecture	MCA202.4	Quiz & End Sem Exam
24	Interior Gateway Routing Protocol (IGRP)	Lecture	MCA202.4	Quiz & End Sem Exam
25	Verifying Your Configurations Routing Techniques	Lecture	MCA202.4	Quiz & End Sem Exam
26	Introduction to traffic Engineering	Lecture	MCA202.4	Quiz & End Sem Exam
27	IP over ATM	Lecture	MCA202.4	Quiz & End Sem Exam
28	Multiprotocol Label Switching, Storage Area Network	Lecture	MCA202.4	Quiz & End Sem Exam
29	Optical Networking, Introduction to Optical Networking	Lecture	MCA202.5	Quiz & End Sem Exam
30	SONET / SDH Standard	Lecture	MCA202.5	Quiz & End Sem Exam

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31	DWDM	Lecture	MCA202.5	Quiz & End Sem Exam
32	Packet Switching Protocols	Lecture	MCA202.5	Quiz & End Sem Exam
33	Introduction to Packet Switching	Lecture	MCA202.5	Quiz & End Sem Exam
34	Introduction to Virtual Circuit Packet Switching	Lecture	MCA202.5	Quiz & End Sem Exam
35	Introduction to X.25	Lecture	MCA202.5	Quiz & End Sem Exam
36	Introducing switched multimegabit data service	Lecture	MCA202.5	Quiz & End Sem Exam

I.

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
MCA202.1	Understan	3	3	1	3	1								2		

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	d t h e f u n d a m e n t a l o f c o m p u t e r N e t w o r k s & O S I m o d e l .															

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MCA2022.2	Use the different communication protocols for data delivery at specified destination.	3	2	2	2	2								1		
MCA2022.3	Apply the knowledge of routing algo	3	2	3	2	2								2		

	orithmstofindshortestpath.															
MCA202.4	Understandtheconceptso	3	3	2	3	2								1		

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	f l n t e r n e t P r o t o c o l s .															
M C A 2 0 2 . 5	U n d e r s t a n d t h e e n d t o e n d d e l i v e r y	2	2	2	2	3								2		

	of data & error control mechanism at transport layer.															

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ATTAINMENT

ESE Marks – MCA 202, ADVANCED COMPUTER NETWORKS

S. No.	Enrollment.No.	Student's Name	MCA202							
			ADVANCED COMPUTER NETWORKS							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U4G4
1	A620145023002	Mr SURYANSHU RAJ	100	30	70	B+	7	3	3	21
2	A620145023003	Mr AYUSH GOYAL	100	30	70	B+	7	3	3	21
3	A620145023004	Mr ANUJ JAIN	100	30	70	B-	5	3	3	15
4	A620145023005	Mr SHIVAM DHUPAD	100	30	70	C+	4	3	3	12
5	A620145023006	Mr AJAY KUMAR RONIYA	100	30	70	C+	4	3	3	12
6	A620145023007	Mr ABHISHEK TRIPATHI	100	30	70	C+	4	3	3	12
7	A620145023008	Mr SARTHAK YADAV	100	30	70	B+	7	3	3	21
8	A620145023009	Mr PANKAJ BARAIYA	100	30	70	C+	4	3	3	12
9	A620145023010	Mr ATHARV PUROHIT	100	30	70	A-	8	3	3	24
10	A620145023012	Mr AMAN SAXENA	100	30	70	A+	10	3	3	30
11	A620145023013	Mr ROHIT GOUR	100	30	70	B+	7	3	3	21
12	A620145023014	Mr PAWAN SINGH RAJAWAT	100	30	70	B-	5	3	3	15

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13	A620145023016	Mr YASHVARDHAN BHADORIA	100	30	70	B	6	3	3	18
14	A620145023017	Mr DEVESH SHARMA	100	30	70	B+	7	3	3	21
15	A620145023019	Mr RITIK MISHRA	100	30	70	A-	8	3	3	24
16	A620145023020	Mr SATYAVRAT SINGH	100	30	70	B+	7	3	3	21
17	A620145023021	Mr RAMASHANKAR SINGH TOMAR	100	30	70	B-	5	3	3	15
18	A620145023023	Mr ANIKET SHARMA	100	30	70	B-	5	3	3	15
19	A620145023025	Mr RISHIRAJ SINGH RAJAWAT	100	30	70	B	6	3	3	18
20	A620145023026	Mr VISHAL SINGH	100	30	70	A-	8	3	3	24
21	A620145023028	Mr ABHISHEK BHADOURIA	100	30	70	B-	5	3	3	15
22	A620145023029	Mr RISHABH MISHRA	100	30	70	B-	5	3	3	15
							134			

Average Grade Point = 134/22 (Total Grade point/Total no of students) = 6.09
No of students getting greater than average (6.09) marks = 10 students = 45.4%

Total No. of Students	**=**	**22**
Level 2	<50% - Average marks	**45.4 %**
Attainment Level		**Level 1**

Note: Attainment Level

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Level 1	<50% - Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course: NETWORKING AND INTERNET ENVIRONMENT
Course Code : BSC 201, Crédits : 02, Session :2021-22(Even Sem.), Class : B.Sc(IT) 2nd Year
Faculty Name: Dr. Samta Jain Goyal

A. Introduction: The objective of the course is to study the design, operation, and challenges of the Internet as a global network and to "fill-in" gaps in students 'networking knowledge.

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

- **BSC201.1.** Know regarding internet related technologies.
- **BSC201.2.** Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

C. Programme Outcomes:

[PO.1].Engineeringknowledge:Applytheknowledgeofmathematics,science,engineeringfundamentals,andanengineeringspecializationtothesolutionofcomplexengineeringproblems

[PO.2]. Problem analysis: Identity, formulate, research literature, and analyze complex engineeringproblems reaching substantiated conclusions using first principles of mathematics, natural sciences,andengineeringsciences

[PO.3]. Design/development of solutions: Design solutions for complex engineering problems and designsystem components or processes that meet the specified needs with appropriate consideration for publichealthandsafety,andthecultural,societal,andenvironmentalconsiderations

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge and researchmethods including design of experiments, analysis, and interpretation of data, and synthesis of theinformationtoprovidevalidconclusions

[PO.5].Moderntoolusage:Create,select,andapplyappropriatetechniques,resources,andmodernengineering and IT tools including prediction and modeling to complex engineering activities with anunderstandingofthelimitations

[PO.6]. The engineer and society: Apply to reason informed by the contextual knowledge to assesssocietal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to theprofessionalengineeringpractice

[PO.7]. Environment and sustainability: Understand the impact of the professional engineering solutions in societalandenvironmentalcontexts,anddemonstratetheknowledgeof,andneedforsustainabledevelopment

[PO.8] Ethics: Apply ethical principles and commit to professional ethics and responsibilities andno

[PO.9] ıber or leader

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indiverseteams,andmultidisciplinarysettings

[PO.10].**Communication**:Communicateeffectivelyoncomplexengineeringactivitieswiththeengineering community and with society at large, such as being able to comprehend and write effective reports anddesigndocumentation,makeeffectivepresentations,andgiveandreceiveclearinstructions

[PO.11].**Projectmanagementandfinance**:Demonstrateknowledgeandunderstandingoftheengineering andmanagementprinciplesandapplythesetoone'swork,asamemberandleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments

[PO.12].**Life-longlearning**:Recognizetheneedfor,andhavethepreparationandabilityto engageinindependent andlife-longlearninginthebroadestcontextoftechnologicalchange

D. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur and a zest for higher studies.

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	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module I: Introduction to HTML/XHTML: (6 Hours)

Module I: (5 Hours)
Introduction to I… pologies, OSI reference model.
Module II: (5 H…
Review of funda… lations of networking protc…

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Module III: (5 Hours)
Introduction to Internet, Internet terminologies: Web Page, Website, Host name, I, URL, IP address, DNS, HTML, HTTP, WWW, search engine, Telnet, FTP, Web 1.0: HTML- URLs and HTTP- The WEB Model
Module IV: (5 Hours)
Internet Architecture, Internet Protocol : IPv4 , IP Datagram Formats, Routing and Forwarding, internet routing and router architectures : Architectural View of the Internet- Allocation of IP Prefixes and AS Number, Traffic Engineering Implications- Internet Routing Instability.

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:

- Network Routing: Algorithms, Protocols, and Architectures Deepankar Medhi and Karthikeyan Ramasamy (Morgan Kaufmann Series in Networking)
- D.E. Comer, "Internetworking with TCP/IP Vol- III", (BSD Sockets Version), Second Edition, Pearson Education, 2003.
- Computer Networks (A.S. Taueubaum) Pearson Edition, 4th Edition
- James Kurose and Keith Ross, "Computer Networking: A Top-Down Approach Featuring the Internet", 1999
- TCP/IP Protocol Suite, (B.A. Forouzum) Tata McGraw Hill Edition, Third Edition

H. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction to Internet: Types of computer network(LAN, MAN, WAN),	Lecture	BSC201.1	Mid Term-1, Quiz & End Sem Exam
2	Introduction to Internet: Types of computer network(LAN, MAN, WAN),	Lecture	BSC201.1	Mid Term-1, Quiz & End Sem Exam
3	Network topology, Different types of topologies	Lecture	BSC201.1	Mid Term-1, Quiz & End Sem Exam
4	OSI reference model	Lecture	BSC201.1	Mid Term-1, Quiz & End Sem Exam
5	OSI reference model	Lecture	BSC201.1	Mid Term-1, Quiz & End Sem Exam
6	Review of fundamental concepts in networking and communication	Lecture	BSC201.2	Mid Term-1, Quiz & End Sem Exam
7	Packet switching techniques and types,	Lecture	BSC201.2	Mid Term-1, Quiz & End Sem Exam
8	Foundations of networking protocols,	Lecture	BSC201.2	Mid Term-1, Quiz & End Sem Exam
9	Internet protocols	Lecture	BSC201.2	Mid Term-1, Quiz & End Sem Exam
10	Basics of wireless and wired networks	Lecture	BSC201.2	Mid Term-1, Quiz & End Sem Exam
11				rm-1, Quiz Sem Exam
12				rm-1, Quiz Sem Exam

	name, I, URL, IP address, DNS, HTML, HTTP, WWW,			
13	search engine, Telnet, FTP, Web 1.0: HTML- URLs and HTTP	Lecture	BSC201.3	Mid Term-1, Quiz & End Sem Exam
14	search engine, Telnet, FTP, Web 1.0: HTML- URLs and HTTP	Lecture	BSC201.3	Mid Term-1, Quiz & End Sem Exam
15	The WEB Model	Lecture	BSC201.3	Mid Term-1, Quiz & End Sem Exam
16	Internet Architecture,	Lecture	BSC201.4	Mid Term-1, Quiz & End Sem Exam
17	internet routing and router architectures : Architectural View of the Internet- Allocation of IP Prefixes and AS Number,	Lecture	BSC201.4	Mid Term-1, Quiz & End Sem Exam
18	internet routing and router architectures : Architectural View of the Internet- Allocation of IP Prefixes and AS Number,	Lecture	BSC201.4	Mid Term-1, Quiz & End Sem Exam
19	Traffic Engineering Implications- Internet Routing Instability.	Lecture	BSC201.4	Mid Term-1, Quiz & End Sem Exam
20	Traffic Engineering Implications- Internet Routing Instability.	Lecture	BSC201.4	Mid Term-1, Quiz & End Sem Exam
21	Revision of Module-I	Lecture	BSC201.1	Mid Term-2, Quiz & End Sem Exam
22	Revision of Module-II	Lecture	BSC201.2	Mid Term-2, Quiz & End Sem Exam
23	Revision of Module-III	Lecture	BSC201.3	Mid Term-2, Quiz & End Sem Exam
24	Revision of Module-IV	Lecture	BSC201.4	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		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BSC201.1	Know regarding internet related	3	3	1	3	1				2		2	1			

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BSC201.2	Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementatio n.	3	2	2	2	2				2		1	1			

S. No.	Enrollment.No.	Student's Name	**BSC201** NETWORKING AND INTERNET ENVIRONMENT Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U6G6
1	A60204923002	Ms ISHA SINGH	100	30	70	B+	7	2	2	14
2	A60204923003	Ms SNEHA HARSANA	100	30	70	A-	8	2	2	16

Average Grade Point = 15 /2(Total Grade point/Total no of students) = 7.50
No of students getting greater than average(7.50) marks = 1 students = 50.0%%

Total No. of Students	=	2
Level 2	>50% average marks and < 60% average marks	50.0%
Attainment Level		Level 2

Level 1	< 50% Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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AMITY UNIVERSITY

MADHYA PRADESH

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

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course: DESIGN AND ANALYSIS OF ALGORITHMS
Course Code : **CSE 303**, Crédits : 04, Session :2023-24(Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name: Dr. Samta Jain Goyal

A. **Introduction:** The objective of this course is to develop Ability to write programs in java to solve problems using algorithm design techniques such as Divide and Conquer, Greedy, Dynamic programming, and Backtracking.

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

CSE303.1. Analyze the asymptotic performance of algorithms.

CSE303.2. Understand rigorous correctness proofs for algorithms.

CSE303.3. Evaluate a familiarity with major algorithms and data structures.

CSE303.4. Apply important algorithmic design paradigms and methods of analysis.

CSE305.5. Understand efficient algorithms in common engineering design situations.

C. Program Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. 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.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Program Specific Outcomes:

PSO1. Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur and a zest for higher studies.

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	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	A	5%

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End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F.

F. Syllabus

Module I: Introduction: Algorithm Design paradigms - Motivation, Concept of algorithmic efficiency, Run Time Analysis of algorithms, Asymptotic Notations. Recurrences- Substitution Method, Recursion Tree Method, Masters Method.

Module II: Divide and conquer: Structure of divide-and-conquer algorithms: examples; Binary search, quick sort, Merge sort, Strassen Multiplication; Analysis of divide and conquer run time recurrence relations. Greedy Method Overview of the greedy paradigm examples of exact optimization solution (minimum cost spanning tree), Approximate solution (Knapsack problem), Single source shortest paths, traveling salesman

Module III: Dynamic programming: Overview, difference between dynamic programming and divide and conquer, Applications: Shortest path in graph, chain Matrix multiplication, Traveling salesman Problem, longest Common sequence, knapsack problem

Module IV: Graph searching and Traversal: Overview, Representation of graphs, strongly connected components, Traversal methods (depth first and breadth first search) Back tracking Overview, 8-queen problem, and Knapsack problem Brach and bound LC searching Bounding, FIFO branch and bound, LC branch and bound application: 0/1 Knapsack problem, Traveling Salesman Problem

Module V: Computational Complexity: Complexity measures, Polynomial Vs non-polynomial time complexity; NP-hard and NP-complete classes, examples.

Text:

E. Horowitz, S. Sahni, and S. Rajsekaran, “Funadmentals of Computer Algorithms”, Galgotia Publication.

T. H. Cormen, Leiserson, Rivest and Stein, “Introduction of Computer algorithm”, PHI.

References:

Sara Basse, A. V. Gelder, “Computer Algorithms”, Addison-Wesley.

J.E Hopcroft, J.D Ullman, “Design and analysis of algorithms”, Addison-Wesley.

D. E. Knuth , “The art of Computer Program”, Addison-Wesley.

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO

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1	Algorithm Design paradigms - Motivation,	Lectu re	CSE303.1	Mid Term-1& End Sem Exam
2	Concept of algorithmic efficiency,	Lectu re	CSE303.1	Mid Term-1 & End Sem Exam
3	Run Time Analysis of algorithms,	Lectu re	CSE303.1	Mid Term-1 & End Sem Exam
4	Asymptotic Notations..	Lectu re	CSE303.1	Mid Term-1 &End Sem Exam
5	Recurrences- Substitution Method,	Lectu re	CSE303.1	Mid Term-1 & End Sem Exam
6	Recursion Tree Method,	Lectu re	CSE303.1	Mid Term-1 & End Sem Exam
7	Masters Method	Lectu re	CSE303.1	Mid Term-1 & End Sem Exam
8	Structure of divide-and-conquer algorithms:	Lectu re	CSE303.1	Mid Term-1& End Sem Exam

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9	examples; Binary search	Lectu re	CSE303.1	Mid Term-1 & End Sem Exam
10	quick sort, Merge sort,	Lectu re	CSE303.1	Mid Term-1 & End Sem Exam
11	Strassen Multiplication;	Lectu re	CSE303.1	Mid Term-1& End Sem Exam
12	Analysis of divide and conquer	Lectu re	CSE303.1	Mid Term-1& End Sem Exam
13	run time recurrence relations.	Lectu re	CSE303.1	Mid Term-1 & End Sem Exam
14	Greedy Method Overview of the greedy paradigm examples of exact optimization solution	Lectu re	CSE303.1	Mid Term-1 & End Sem Exam
15	(minimum cost spanning tree),	Lectu re	CSE303.1	Mid Term-1 & End Sem Exam
16	Approximate solution	Lectu re	CSE303.1	Mid Term-1& End Sem Exam

17	(Knapsack problem),	Lectu re	CSE303.2	Mid Term-1 & End Sem Exam
18	Single source shortest paths,	Lectu re	CSE303.2	Mid Term-1 & End Sem Exam
19	traveling salesman	Lectu re	CSE303.2	Mid Term-1 & End Sem Exam
20	Overview, difference between dynamic programming	Lectu re	CSE303.2	Mid Term-1 & End Sem Exam
21	and divide and conquer, Applications:	Lectu re	CSE303.2	Mid Term-1& End Sem Exam
22	Shortest path in graph,	Lectu re	CSE303.2	Mid Term-1& End Sem Exam
23	chain Matrix multiplication,	Lectu re	CSE303.2	Mid Term-1& End Sem Exam
24	Traveling salesman Problem	Lectu re	CSE303.2	Mid Term-1& End Sem Exam

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25	longest Common sequence	Lectu re	CSE303.3	Quiz & End Sem Exam
26	, knapsack problem	Lectu re	CSE303.3	Quiz & End Sem Exam
27	Graph searching	Lectu re	CSE303.3	Quiz & End Sem Exam
28	TraversalOverview,	Lectu re	CSE303.3	Quiz & End Sem Exam
29	Representation of graphs,	Lectu re	CSE303.3	Quiz & End Sem Exam
30	strongly connected components,	Lectu re	CSE303.3	Quiz & End Sem Exam
31	Traversal methods (depth first and breadth first search)	Lectu re	CSE303.4	Quiz & End Sem Exam
32	Back tracking Overview,	Lectu re	CSE303.4	Quiz & End Sem Exam
33	8-queen problem,	Lectu re	CSE303.4	Quiz & End Sem Exam

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34	and Knapsack problem Brach and bound LC searching Bounding, FIFO branch and bound, LC branch and bound application: 0/1 Knapsack problem, Traveling Salesman Problem	Lectu re	CSE303.5	Quiz & End Sem Exam
35	Computational Complexity: Complexity measures, Polynomial Vs non-polynomial time complexity;	Lectu re	CSE303.5	Quiz & End Sem Exam
36	NP-hard and NP-complete classes, examples.	Lectu re	CSE303.5	Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE303.1	Analyze the a	3	2											1		

	symptotic performance of algorithms.															
CSE303.2	Understand rigorous correctness proofs for algorithms.															

CSE303.3	Evaluate a familiarity with major algorithms and data structures.	3	2	1	1									1		
CSE303.4	Apply important algorithmic design paradigms and methods of analysis.	3												1		

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CSE305.5	Understand efficient algorithms in common engineering design situations.															

ATTAINMENT

ESE Marks – CSE 303, DESIGN AND ANALYSIS OF ALGORITHMS

S. No.	Enrollment.No.	Student's Name	CSE303 DESIGN AND ANALYSIS OF ALGORITHMS							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U4G4
1	A60205221001	Mr MARAMREDDY ASHISH KUMAR REDDY	100	30	70	A-	8	4	4	32
2	A60205221003	Mr SANJAY KUSHWAH	100	30	70	A-	8	4	4	32
3	A60205221007	Mr SUYASH DESHMUKH	100	30	70	B+	7	4	4	28
4	A60205221046	Mr YASIR KHAN	100	30	70	B	6	4	4	24
5	A60205221057	Mr MIRIYAM HEMANTH KUMAR	100	30	70	A	9	4	4	36

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6	A60205221009	Mr PRANSHUL SHARMA	100	30	70	A	9	4	4	36
7	A60205221016	Mr HARSHIT SHARMA	100	30	70	B	6	4	4	24
8	A60205221021	Mr DHARMENDRA DIWAKAR	100	30	70	B+	7	4	4	28
9	A60205221034	Mr TARUN SINGH TOMAR	100	30	70	B	6	4	4	24
10	A60205221036	Ms KARTIKA CHAUHAN	100	30	70	A-	8	4	4	32
11	A60205221010	Mr VANSH GUPTA	100	30	70	B	6	4	4	24
12	A60205221031	Ms MANYATA SINGH	100	30	70	B+	7	4	4	28
13	A60205221033	Mr SANDEEP SHARMA	100	30	70	A-	8	4	4	32
14	A60205221071	Ms SWATI GUPTA	100	30	70	A-	8	4	4	32
15	A60205221081	Mr DEVANSH VERMA	100	30	70	B+	7	4	4	28
16	A60205221013	Ms PEARL BANSAL	100	30	70	B+	7	4	4	28
17	A60205221023	Mr VIVEK YADAV	100	30	70	B	6	4	4	24
18	A60205221025	Mr YASH SHARMA	100	30	70	B	6	4	4	24
19	A60205221026	Ms PRAGYA GUPTA	100	30	70	A	9	4	4	36
20	A60205221038	Ms VANDANA	100	30	70	A-	8	4	4	32
21	A60205221002	Mr VEDANT GUPTA	100	30	70	B	6	4	4	24
22	A60205221004	Mr VISHAL KUMAR	100	30	70	A-	8	4	4	32
23	A60205221022	Mr SANSKAR SONI	100	30	70	A-	8	4	4	32
24	A60205221029	Mr PRIYANSHU KUMAR	100	30	70	A	9	4	4	36

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25	A60205221047	Mr ANUSH M K	100	30	70	A-	8	4	4	32
26	A60205221005	Mr ANURAG SINGH RANA	100	30	70	B+	7	4	4	28
27	A60205221011	Ms ANDREA NARCIS	100	30	70	A	9	4	4	36
28	A60205221039	Ms MUSKAN BANSAL	100	30	70	B+	7	4	4	28
29	A60205221051	Mr VIPUL KUMAR	100	30	70	A-	8	4	4	32
30	A60205221066	Mr HARSHAVARDHAN CHEVADABOINA	100	30	70	B	6	4	4	24
31	A60205221020	Mr HARSH RAJ SINGH CHAUHAN	100	30	70	A	9	4	4	36
32	A60205221035	Mr BIKASH NATH	100	30	70	B+	7	4	4	28
33	A60205221041	Mr ARYAN SINGH TOMAR	100	30	70	A-	8	4	4	32
34	A60205221052	Mr ABHINAV KUMAR	100	30	70	F	0	4	0	0
35	A60205221061	Mr DEEPENDRA SHARMA	100	30	70	B+	7	4	4	28
36	A60205221012	Mr ROHIT SHARMA	100	30	70	A+	10	4	4	40
37	A60205221018	Mr SAHIL KHAN	100	30	70	B+	7	4	4	28
38	A60205221024	Ms MEGHNA GUPTA	100	30	70	A	9	4	4	36
39	A60205221027	Ms SIMRAN SINGH	100	30	70	A-	8	4	4	32
40	A60205221042	Ms KRATI GOYAL	100	30	70	A-	8	4	4	32
41	A60205221059	Mr AYUSH TOMAR	100	30	70	B	6	4	4	24
42	A60205221068	Ms SHRUTI AGARWAL	100	30	70	A+	10	4	4	40
43	A60205221080	Mr ABHISHEK SHARMA								

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44	A60205221082	Mr MOKSH TIWARI	100	30	70	B	6	4	4	24
45	A60205221094	Ms PURVI GUPTA	100	30	70	A-	8	4	4	32
46	A60205221040	Mr SHOBHIT CHATURVEDI	100	30	70	A	9	4	4	36
47	A60205221062	Mr MAYANK BOHARE	100	30	70	B+	7	4	4	28
48	A60205221074	Ms SHATAKSHI SHARMA	100	30	70	A-	8	4	4	32
49	A60205221075	Mr SHUBHAM GOYAL	100	30	70	F	0	4	0	0
50	A60205221087	Mr KONJETI MOHAN SAI AKHIL	100	30	70	A-	8	4	4	32
51	A60205221099	Mr MANAV PRATAP SINGH TOMAR	100	30	70	B+	7	4	4	28
52	A60205221101	Mr ANUBHAV KHANDELWAL	100	30	70	A+	10	4	4	40
53	A60205221111	Ms VAISHALI PATEL	100	30	70	A	9	4	4	36
54	A60205221131	Mr SHIVANK SINGH BHADAURIA	100	30	70	A-	8	4	4	32
55	A60205221137	Ms SNEHA GUPTA	100	30	70	B	6	4	4	24
56	A60205221054	Mr HIMANSHU SINGH	100	30	70	B+	7	4	4	28
57	A60205221056	Mr MORUBOYINA VENKATA SAI AKHIL	100	30	70	B+	7	4	4	28
58	A60205221063	Mr ADESH TIWARI	100	30	70	F	0	4	0	0
59	A60205221065	Mr ABHISHEK SINGH	100	30	70	A-	8	4	4	32
60	A60205221078	Ms ISHU KUSHWAH	100	30	70	B	6	4	4	24
61	A60205221055	Mr SHIVAM SINGH TOMAR	100	30	70	A-	8	4	4	32
62	A60205221058	Mr AYUSH SHARMA								

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63	A60205221069	Mr LOVE KUMAR	100	30	70	B	6	4	4	24
64	A60205221085	Mr HRISHI SHARMA	100	30	70	B	6	4	4	24
65	A60205221095	Mr SURAJ SINGH TOMAR	100	30	70	A-	8	4	4	32
66	A60205221077	Mr BADAL KUSHWAH	100	30	70	F	0	4	0	0
67	A60205221091	Mr YUVRAJ SINGH PARIHAR	100	30	70	F	0	4	0	0
68	A60205221098	Mr SUYASH PATHAK	100	30	70	B	6	4	4	24
69	A60205221126	Mr VISHNU SHARMA	100	30	70	F	0	4	0	0
70	A60205221132	Mr KISHAN RATHORE	100	30	70	B+	7	4	4	28
71	A60205221073	Mr UTKARSH BHADORIA	100	30	70	B+	7	4	4	28
72	A60205221076	Mr AKSHAT SHRIVASTAVA	100	30	70	A	9	4	4	36
73	A60205221088	Mr CHIRAG SISODIYA	100	30	70	F	0	4	0	0
74	A60205221106	Mr ROHAN RAKSHIT	100	30	70	B	6	4	4	24
75	A60205221109	Mr DODLA AJAY KUMAR	100	30	70	A-	8	4	4	32
76	A60205221053	Mr AYUSH SHARMA	100	30	70	F	0	4	0	0
77	A60205221064	Ms NIKHAT FATIMA	100	30	70	B+	7	4	4	28
78	A60205221079	Mr PRIYANSHU TANGAR	100	30	70	A+	10	4	4	40
79	A60205221083	Mr RAJ SHARMA	100	30	70	B	6	4	4	24
80	A60205221089	Ms VANSHIKA SISODIYA	100	30	70	A	9	4	4	36
81	A60205221100	Mr ANMOL KUMAR								

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82	A60205221116	Mr ISHAAN DHINGRA	100	30	70	B+	7	4	4	28
83	A60205221129	Mr AJAY PARIHAR	100	30	70	B+	7	4	4	28
84	A60205221148	Ms SWETA	100	30	70	A-	8	4	4	32
85	A60205221161	Ms KHUSHI SHARMA	100	30	70	B	6	4	4	24
86	A60205221107	Mr ANURAG SINGH BHADORIA	100	30	70	A-	8	4	4	32
87	A60205221108	Ms VEDIKA YERUNKAR	100	30	70	A	9	4	4	36
88	A60205221112	Ms SMRUTI SRADHA JENA	100	30	70	A-	8	4	4	32
89	A60205221123	Mr NARENDRA SINGH YADAV	100	30	70	A	9	4	4	36
90	A60205221127	Mr MADHUR GUPTA	100	30	70	B	6	4	4	24
91	A60205221147	Mr YASH KUMAR SAH	100	30	70	B+	7	4	4	28
92	A60205221162	Mr DEVANSH CHATURVEDI	100	30	70	B+	7	4	4	28
93	A60205221164	Mr SATISH KUMAR	100	30	70	B+	7	4	4	28
94	A60205221179	Mr GAURAV SINGH	100	30	70	B	6	4	4	24
95	A60205221198	Ms PRIYA SINGH TOMAR	100	30	70	A-	8	4	4	32
96	A60205221202	Ms K. SUKESHINI	100	30	70	B+	7	4	4	28
97	A60205221212	Ms SNEHA BHADOURIYA	100	30	70	B+	7	4	4	28
98	A60205221217	Mr AYUSH SINGH	100	30	70	A-	8	4	4	32
99	A60205221219	Mr NIKHIL SHARMA	100	30	70	A-	8	4	4	32

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100	A60205221223	Mr ANUJ CHAURASIYA	100	30	70	B	6	4	4	24
101	A60205221084	Mr DEVESH SHRIVAS	100	30	70	F	0	4	0	0
102	A60205221086	Mr SANDEEP YADAV	100	30	70	B+	7	4	4	28
103	A60205221090	Mr SAKSHAM JAIN	100	30	70	A	9	4	4	36
104	A60205221092	Mr JAIDEEP SHARMA	100	30	70	B	6	4	4	24
105	A60205221096	Mr ADITYA PRATAP SINGH	100	30	70	F	0	4	0	0
106	A60205221102	Mr PANKAJ KUMAR	100	30	70	A-	8	4	4	32
107	A60205221120	Mr KUNAL RATHORE	100	30	70	F	0	4	0	0
108	A60205221125	Mr NISHANT RAJPUT	100	30	70	F	0	4	0	0
109	A60205221130	Mr GARVIT SINGHAL	100	30	70	B+	7	4	4	28
110	A60205221151	Mr TAPISH SHARMA	100	30	70	B+	7	4	4	28
111	A60205221105	Mr KARANVEER SINGH RAJAWAT	100	30	70	B	6	4	4	24
112	A60205221133	Mr PRATIK KUMAR JHA	100	30	70	A-	8	4	4	32
113	A60205221149	Mr DEVANSH DUBEY	100	30	70	B+	7	4	4	28
114	A60205221150	Ms OJASVI SHARMA	100	30	70	B+	7	4	4	28
115	A60205221152	Ms KHUSHI CHAUHAN								

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116	A60205221160	Mr SHISHANK BHATNAGAR	100	30	70	A	9	4	4	36
117	A60205221177	Mr AKHILESH SINGH TOMAR	100	30	70	B+	7	4	4	28
118	A60205221181	Mr RITHIK NAIR	100	30	70	B+	7	4	4	28
119	A60205221183	Mr PRANSHU SHARMA	100	30	70	B+	7	4	4	28
120	A60205221214	Ms PRIYA KUMARI YADAV	100	30	70	A-	8	4	4	32
121	A60205221156	Mr RAJ SINGH RAJAWAT	100	30	70	B+	7	4	4	28
122	A60205221167	Mr AASHI GUPTA	100	30	70	A-	8	4	4	32
123	A60205221173	Ms VAISHNAVI	100	30	70	A	9	4	4	36
124	A60205221190	Mr ROHIT KUMAR PANDEY	100	30	70	B+	7	4	4	28
125	A60205221205	Ms AARUSHI SABOO	100	30	70	A+	10	4	4	40
126	A60205221121	Mr JYOTIRADITYA KUMAR SHRIVASTAVA	100	30	70	A-	8	4	4	32
127	A60205221124	Mr ARYAN VYAS	100	30	70	F	0	4	0	0
128	A60205221135	Mr HARSHVARDHAN SINGH TOMAR	100	30	70	A-	8	4	4	32
129	A60205221140	Ms RAJVINDER KAUR	100	30	70	A-	8	4	4	32
130	A60205221141	Mr HARENDRA PRATAP SINGH BHADORIYA	100	30	70	A	9	4	4	36

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131	A60205221093	Mr RAHUL SINGH DHAKAD	100	30	70	B+	7	4	4	28
132	A60205221103	Ms SUCHI JAIN	100	30	70	A	9	4	4	36
133	A60205221113	Ms ANAMIKA BAJPAI	100	30	70	B+	7	4	4	28
134	A60205221128	Mr YASH PATHAK	100	30	70	A	9	4	4	36
135	A60205221138	Ms KHUSHBOO JAIN	100	30	70	A-	8	4	4	32
136	A60205221163	Mr ABHISHEK RAJPUT	100	30	70	B+	7	4	4	28
137	A60205221174	Mr RITESH DWIVEDI	100	30	70	B+	7	4	4	28
138	A60205221176	Mr ABHAY SINGH BHADAURIA	100	30	70	A	9	4	4	36
139	A60205221180	Ms PRIYANSHI GUPTA	100	30	70	A	9	4	4	36
140	A60205221215	Mr ROHIT JAIN	100	30	70	A+	10	4	4	40
141	A60205221142	Mr AKASH YADAV	100	30	70	A-	8	4	4	32
142	A60205221157	Mr ABHISHEK SHARMA	100	30	70	B+	7	4	4	28
143	A60205221168	Mr NAMVER ALI ZAIDI	100	30	70	B	6	4	4	24
144	A60205221188	Mr UJJWAL SHRIVASTAVA	100	30	70	A	9	4	4	36
145	A60205221197	Ms ANSHIKA DAS	100	30	70	A	9	4	4	36
146	A60205221201	Ms ANUSHKA TRIPATHI								

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147	A60205221246	Mr SATYAM RAJAWAT	100	30	70	B	6	4	4	24
148	A60205221247	Ms ANUSHKA TOMAR	100	30	70	A-	8	4	4	32
149	A60205221251	Mr YASH RAGHUVANSHI	100	30	70	B+	7	4	4	28
150	A60205221256	Mr VIVEK PAL	100	30	70	A+	10	4	4	40
151	A60205221226	Mr ARIN SHARMA	100	30	70	A	9	4	4	36
152	A60205221228	Mr PRAHARSH RAJ SINGH	100	30	70	A-	8	4	4	32
153	A60205221262	Ms ANAMIKA RAJPUT	100	30	70	A	9	4	4	36
154	A60205221264	Mr ARNAV SHARMA	100	30	70	A+	10	4	4	40
155	A60205221272	Ms ROJA SHARMA	100	30	70	A	9	4	4	36
156	A60205221274	Mr ADITYA RATHORE	100	30	70	A	9	4	4	36
157	A60205221285	Ms SAKSHI UPADHYAY	100	30	70	A-	8	4	4	32
158	A60205221287	Ms RITI MEENA	100	30	70	A-	8	4	4	32
159	A60205221309	Mr DEEP MATHUR	100	30	70	B+	7	4	4	28
160	A60205221310	Mr MRADUL SINGH RAJAWAT	100	30	70	A	9	4	4	36
161	A60205221153	Mr ARYAN KHAN	100	30	70	F	0	4	0	0
162	A60205221170	Mr VIKAS PATIDAR								

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163	A60205221172	Mr HARIOM PATEL	100	30	70	A-	8	4	4	32
164	A60205221184	Ms PRATHA KHARE	100	30	70	B+	7	4	4	28
165	A60205221208	Ms MOULI TIWARI	100	30	70	F	0	4	0	0
166	A60205221231	Ms SANSKRITI GUPTA	100	30	70	A-	8	4	4	32
167	A60205221235	Ms HIMANSHI SHARMA	100	30	70	B+	7	4	4	28
168	A60205221237	Ms GARIMA GUPTA	100	30	70	A-	8	4	4	32
169	A60205221242	Mr DEVASHISH	100	30	70	B+	7	4	4	28
170	A60205221244	Mr ARJIT SHARMA	100	30	70	B+	7	4	4	28
171	A60205221207	Mr AKSHAT SHANDILYA	100	30	70	B	6	4	4	24
172	A60205221218	Mr VIVEK YADAV	100	30	70	B+	7	4	4	28
173	A60205221222	Ms KRATIKA JADON	100	30	70	B+	7	4	4	28
174	A60205221227	Ms SALONI OJHA	100	30	70	A-	8	4	4	32
175	A60205221254	Mr ABHAY SINGH BHADAURIYA	100	30	70	F	0	4	0	0
176	A60205221261	Ms PRIYANSHI GARG	100	30	70	B+	7	4	4	28
177	A60205221277	Mr JATIN SHRIVASTAVA	100	30	70	B	6	4	4	24
178	A60205221278	Ms DEERGHA TIWARI								

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179	A60205221288	Mr VAIBHAV GARG	100	30	70	A-	8	4	4	32
180	A60205221293	Mr HAPPY BHASIN	100	30	70	B+	7	4	4	28
181	A60205221158	Mr ABHISHEKH SINGH	100	30	70	A	9	4	4	36
182	A60205221166	Mr PRABHANSHU AGASHE	100	30	70	A-	8	4	4	32
183	A60205221169	Ms ARADHNA RAJORIYA	100	30	70	A-	8	4	4	32
184	A60205221189	Mr YOGESH VERMA	100	30	70	B	6	4	4	24
185	A60205221191	Mr SHREYASH DWIVEDI	100	30	70	A-	8	4	4	32
186	A60205221139	Mr RAVI SINGH TOMAR	100	30	70	B+	7	4	4	28
187	A60205221154	Mr PIYUSH SINGH	100	30	70	B+	7	4	4	28
188	A60205221165	Ms AYUSHI AWASTHI	100	30	70	A	9	4	4	36
189	A60205221171	Ms METTU NAVYA SHREE	100	30	70	B+	7	4	4	28
190	A60205221178	Ms AELLI GUPTA	100	30	70	A+	10	4	4	40
191	A60205221216	Mr ADITYA PATERIYA	100	30	70	A-	8	4	4	32
192	A60205221220	Mr SHAILENDRA SINGH	100	30	70	A	9	4	4	36
193	A60205221229	Ms ANANYA SINGH	100	30	70	B	6	4	4	24
194	A60205221232	Ms SAKSHI SHAHI								

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195	A60205221234	Ms SHRUTI DIXIT	100	30	70	B	6	4	4	24
196	A60205221236	Ms URVASHI SHARMA	100	30	70	A	9	4	4	36
197	A60205221241	Mr SANTOSH SINGH TOMAR	100	30	70	A-	8	4	4	32
198	A60205221265	Mr KAUSTUBH ADITYA SHARMA	100	30	70	F	0	4	0	0
199	A60205221267	Mr AMIT RAI	100	30	70	A	9	4	4	36
200	A60205221269	Mr SAHITYA SATYA	100	30	70	B+	7	4	4	28
201	A60205221271	Mr HARSH SHARMA	100	30	70	B	6	4	4	24
202	A60205221273	Ms ARPITA BHARGAVA	100	30	70	A+	10	4	4	40
203	A60205221286	Mr DEVANSH TOMAR	100	30	70	F	0	4	0	0
204	A60205221308	Mr KARTIK NEDIYARA	100	30	70	A-	8	4	4	32
205	A60205221221	Ms DIVYANSHI BHADORIA	100	30	70	A	9	4	4	36
206	A60205221258	Ms VAISHALI PATERIYA	100	30	70	A-	8	4	4	32
207	A60205221259	Mr KARAN KUMAR CHAURASIA	100	30	70	A-	8	4	4	32
208	A60205221260	Ms MUSKAN MANGAL	100	30	70	A-	8	4	4	32
209	A60205221289	Mr SHUBHAM DWIVEDI	100	30	70	B	6	4	4	24
210	A60205221295	Mr PRASHANT KUMAR								

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211	A60205221296	Mr YASH RAI	100	30	70	A-	8	4	4	32
212	A60205221299	Mr ABHISHEK SHARMA	100	30	70	A-	8	4	4	32
213	A60205221305	Ms BHARTI SAHU	100	30	70	A+	10	4	4	40
214	A60205221185	Mr KOVURI PRAMOD SAI	100	30	70	F	0	4	0	0
215	A60205221192	Mr VANSH AGGARWAL	100	30	70	B+	7	4	4	28
216	A60205221195	Mr ANURAG SINGH TOMAR	100	30	70	F	0	4	0	0
217	A60205221203	Mr HARSH MALVIYA	100	30	70	A	9	4	4	36
218	A60205221210	Mr HARSH TIWARI	100	30	70	B+	7	4	4	28
219	A60205221224	Mr SHIVAM UPADHYAY	100	30	70	B+	7	4	4	28
220	A60205221225	Mr ADARSH KUSHWAH	100	30	70	B	6	4	4	24
221	A60205221239	Mr AAYUSH KUMAR	100	30	70	B+	7	4	4	28
222	A60205221249	Mr PIYUSH SHUKLA	100	30	70	A	9	4	4	36
223	A60205221252	Mr RUPESH SINGH	100	30	70	F	0	4	0	0
224	A60205221211	Mr DEVASHISH PANDEY	100	30	70	B+	7	4	4	28
225	A60205221243	Ms SHRUTI SINGH KUSHWAH	100	30	70	A	9	4	4	36
226	A60205221253	Mr NILAY KUMAR SINGH								

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227	A60205221282	Mr HEMRAJ PATHAK	100	30	70	B+	7	4	4	28
228	A60205221312	Mr GAURAV VYAS	100	30	70	B+	7	4	4	28
229	A60205221257	Ms ROLI TIWARI	100	30	70	F	0	4	0	0
230	A60205221290	Mr SUJAL MAURYA	100	30	70	F	0	4	0	0
231	A60205221297	Mr ANUBHAV SHARMA	100	30	70	F	0	4	0	0
232	A60205221298	Mr VIBHOR AGRAWAL	100	30	70	A	9	4	4	36
233	A60205221300	Mr VAIBHAV SINGH	100	30	70	B	6	4	4	24
234	A60205221294	Ms RIYA SINGH	100	30	70	F	0	4	0	0
235	A60205221306	Mr ANKIT KAURAV	100	30	70	A-	8	4	4	32
236	A60205221303	Mr AYUSH JOON	100	30	70	A-	8	4	4	32
237	A60205221266	Mr AMIT SINGH	100	30	70	F	0	4	0	0
238	A60205221268	Ms SHRAVANI VAIDYA	100	30	70	A+	10	4	4	40
239	A60205221270	Ms YASHIKA UPADHYAY	100	30	70	A-	8	4	4	32
240	A60205221281	Mr SUJAL SHAKYA	100	30	70	A-	8	4	4	32
241	A60205221263	Mr DEVESH SHAH	100	30	70	A	9	4	4	36
242	A60205221275	Mr ABHAY SINGH CHANDEL								

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243	A60205221291	Mr RISHEEK SHUKLA	100	30	70	A	9	4	4	36
244	A60205221301	Ms ANGEL RAJPUT	100	30	70	A	9	4	4	36
245	A60205221311	Mr AJAY SINGH GANGWAR	100	30	70	B+	7	4	4	28
							1670			

Average Grade Point = 1670/245 (Total Grade point/Total no of students) = 6.81
No of students getting greater than average (6.81) marks = 182 students = 74.2%

Total No. of Students	**=**	**245**
Level 3	> 60% Average marks	**74.2%**
Attainment Level		**Level 3**

Note: Attainment Level

Level 1	<50% - Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : Database Management System
Course Code : CSE-304, Crédits : 03, Session : 2023-24 (Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : MS. Anshita Shukla

A. **Introduction:** The objective of this course is to get students familiar with Databases and their use. They can identify different types of available database model, concurrency techniques and new applications of the DBMS

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

CSE304.1 Understand the basic architecture of DBMS, physical and logical database designs, database modeling, relational, hierarchical and network models.

CSE304.2. Identify basic database storage structures and access techniques such as file organizations, indexing methods including B-tree, and hashing.

CSE304.3. Apply Structured query language (SQL) for database definition and database manipulation.

CSE304.4. Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.

CSE304.5. Analyze various transaction processing, concurrency control mechanisms and database protection mechanisms.

Programme Outcomes:

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess

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societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **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

C. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

D. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Quiz		
	Seminar/Viva-Voce/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a student to	A	5%

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	be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.		
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

E. Syllabus

Module I: Introduction

Concept and goals of DBMS, Database Languages, Database Users, Database Abstraction. Basic Concepts of ER Model, Relationship sets, Keys, Mapping, Design of ER Model, Concept of Generalization, Aggregation and Specialization. Transforming ER diagram into the tables. Various other data models object oriented data Model, Network data model, and Relational data model.

.**Module II**: Relational Data Model

Domains, Tuples, Attributes, Relations, Characteristics of relations, Keys, Key attributes of relation, Relational database, Schemas, Integrity constraints. Referential integrity, Intension and Extension, Relational Query languages: SQL-DDL, DML, integrity constraints, Complex queries, various joins, indexing, triggers ,Relational algebra and relational calculus, Relational algebra operations like select, Project, Join, Division, outer union. Tuple relational calculus.

Module III: Database Design

Data Base Design: Introduction to normalization, Normal forms, Functional dependency, Decomposition, Dependency preservation and lossless join, problems with null valued and dangling tuples, multivalued dependencies.

Module IV: Transaction Processing Concepts

Transaction System, Testing of Serilizability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures. Log based recovery. Checkpoints deadlock handling. Concurrency Control Techniques: – Concurrency Control, locking Techniques for concurrency control, time stamping protocols for concurrency control, validation-based protocol, multiple granularity. Multi version schemes, Recovery with concurrent transaction.

Module V: Relational Database Management Systems

Study of Relational Database Management Systems through Oracle/Postgres SQL/MySQL: Architecture, physical files, memory structures, background process. Concept of table spaces, segments, extents and block. Dedicated server, multi-threaded server, distributed database. Introduction of ANSI SQL. Usage of like, any, all, exists, views and other commands, Special operators. Hierarchical queries, inline queries, flashback queries.

F. Examination Scheme:

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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:

- Database System Concepts" by Abraham Silberschatz and S Sudarshan.
- Introduction to Database Management Systems" by Kahate.
- An Introduction to Database Systems" by Bipin Desai.
- Principles of Database Systems" by J D Ullman.

H. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Concept and goals of DBMS	Lecture	CSE304.1	Mid Term-1 & End Sem Exam
2	Database Languages	Lecture	CSE304.1	Mid Term-1 & End Sem Exam
3	Database Users	Lecture	CSE304.1	Mid Term-1 & End Sem Exam
4	Database Abstraction	Lecture	CSE304.1	Mid Term-1 & End Sem Exam
5	Basic Concepts of ER Model	Lecture	CSE304.1	Mid Term-1 & End Sem Exam
6	Relationship sets, Keys	Lecture	CSE304.1	Mid Term-1 & End Sem Exam
7	Mapping, Design of ER Mode	Lecture	CSE304.1	Mid Term-1 & End Sem Exam
8	Concept of Generalization	Lecture	CSE304.1	Mid Term-1 & End Sem Exam
9	Aggregation and Specialization	Lecture	CSE304.1	Mid Term-1 & End Sem Exam
10	Transforming ER diagram into the tables.	Lecture	CSE304.1	Mid Term-1 & End Sem Exam
11	Various other data models object oriented data Model	Lecture	CSE304.1	Mid Term-1 & End Sem Exam
12	Network data model,	Lecture	CSE304.1	Mid Term-1 & End Sem Exam
13	Relational data model.	Lecture	CSE304.1	Mid Term-1 & End Sem Exam
14	Domains, Tuples, Attributes	Lecture	CSE304.2	Mid Term-1 & End Sem Exam
15	Relations, Characteristics of relations,	Lecture	CSE304.2	Mid Term-1 & End Sem Exam
16	Keys, Key attributes of relation,	Lecture	CSE304.2	Mid Term-1 & End Sem Exam

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17	Relational database, Schemas,	Lecture	CSE304.2	Mid Term-1 & End Sem Exam
18	Integrity constraints. Referential integrity	Lecture	CSE304.2	Mid Term-1 & End Sem Exam
19	Intension and Extension, Relational Query languages	Lecture	CSE304.2	Mid Term-1 & End Sem Exam
20	SQL-DDL, DML,	Lecture	CSE304.2	Mid Term-1 & End Sem Exam
21	integrity constraints, Complex queries	Lecture	CSE304.2	Mid Term-1 & End Sem Exam
22	various joins, indexing, triggers	Lecture	CSE304.2	Mid Term-1 & End Sem Exam
23	Relational algebra and relational calculus,	Lecture	CSE304.2	Mid Term-1 & End Sem Exam
24	Relational algebra operations like select	Lecture	CSE304.2	Mid Term-1 & End Sem Exam
25	Project, Join, Division	Lecture	CSE304.2	Quiz & End Sem Exam
26	outer union. Tuple relational calculus.	Lecture	CSE304.2	Quiz & End Sem Exam
27	Data Base Design: Introduction to normalization	Lecture	CSE304.3	Quiz & End Sem Exam
28	Normal forms, Functional dependency, Decomposition	Lecture	CSE304.3	Quiz & End Sem Exam
29	Dependency preservation and lossless join	Lecture	CSE304.3	Quiz & End Sem Exam
30	Problems with null valued and dangling tuples, multivalued dependencies.	Lecture	CSE304.3	Quiz & End Sem Exam
31	Transaction System, Testing of Serilizability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures. Log based recover	Lecture	CSE304.4	Quiz & End Sem Exam
32	Checkpoints deadlock handling. Concurrency Control Techniques: – Concurrency Control, locking Techniques for concurrency control, time stamping protocols for concurrency control, validation-based protocol	Lecture	CSE304.4	Quiz & End Sem Exam
33	Multiple granularity. Multi version schemes, Recovery with concurrent	Lecture	CSE304.4	Quiz & End Sem Exam

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	transaction.			
34	Study of Relational Database Management Systems through Oracle/Postgres SQL/MySQL: Architecture, physical files, memory structures, background process. Concept of table spaces, segments,	Lecture	CSE304.5	Quiz & End Sem Exam
35	Extents and block. Dedicated server, multi-threaded server, distributed database. Introduction of ANSI SQL. Usage of like, any, all, exists, views and other commands	Lecture	CSE304.5	Quiz & End Sem Exam
36	Special operators. Hierarchical queries, inline queries, flashback queries	Lecture	CSE304.5	Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE304.1	Understand the basic architecture of DBMS, physical and logical database designs, database modeling, relational, hierarchical and network models.													3	2	
CSE304.2	Identify basic database storage structures and access techniques such as file organizations, indexing methods including B-tree, and hashing.													3	2	
CSE304.3	Apply Structured query language (SQL) for database definition and	1	2	3	1	2										

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	database manipulation.															
CSE304.4	Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.	1	1	3	1	2										
CSE304.5	Analyze various transaction processing, concurrency control mechanisms and database protection mechanisms..	1	2	2	1	2										

ATTAINMENT

ESE CSE304 DATABASE MANAGEMENT SYSTEMS LAB

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S. No.	Enrollment.No.	Student's Name	CSE324 DATABASE MANAGEMENT SYSTEMS LAB Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U15G15
1	A60205222012	Mr NITIN JHA	100	30	70	A-	8	1	1	8
2	A60205222011	Ms DIKSHA BATHAM	100	30	70	A+	10	1	1	10
3	A60205222009	Ms AAYUSHI ARORA	100	30	70	B+	7	1	1	7
4	A60205222004	Mr KAUSHAL SHARMA	100	30	70	A	9	1	1	9
5	A60205221048	Mr DHRUV SINGH RAWAT	100	30	70	A	9	1	1	9
6	A60205222035	Mr DIVYANSH TRIPATHI	100	30	70	A-	8	1	1	8
7	A60205221044	Mr RAJEEV SHARMA	100	30	70	B+	7	1	1	7
8	A60205222015	Ms MOHINI SHARMA	100	30	70	A+	10	1	1	10
9	A60205222021	Mr PRAKHAR TIWARI	100	30	70	A-	8	1	1	8
10	A60205222020	Mr MOHIT YADAV	100	30	70	A	9	1	1	9
11	A60205222030	Mr ANSHUL CHANDRA	100	30	70	A	9	1	1	9
12	A60205222005	Mr ENOCH NEERIKSHAN	100	30	70	A-	8	1	1	8
13	A60205222001	Mr SIDDHARTH JAIN	100	30	70	A	9	1	1	9
14	A60205222037	Ms AKANKSHA RAJPUT	100	30	70	A-	8	1	1	8
15	A60205222002	Ms RIYA KUSHWAH	100	30	70	A+	10	1	1	10
16	A60205222036	Mr ADITYA SINGH	100	30	70	A-	8	1	1	8

Director-ASET
Amity University Madhya Pradesh Gwalior

		CHAUHAN								
17	A60205222046	Mr ASHISH SINGH	100	30	70	A-	8	1	1	8
18	A60205222022	Ms ANUSHKA SHARMA	100	30	70	A+	10	1	1	10
19	A60205222033	Mr SHIVAM CHAURASIYA	100	30	70	B+	7	1	1	7
20	A60205222031	Mr SHIVAM SHRIVASTAVA	100	30	70	A	9	1	1	9
21	A60205222016	Mr SHAILENDRA MOURYA	100	30	70	A	9	1	1	9
22	A60205222068	Mr VIVEK SINGH BHADORIA	100	30	70	A-	8	1	1	8
23	A60205222006	Mr PRAVEEN KUMAR RAWAT	100	30	70	A	9	1	1	9
24	A60205222041	Mr BHUPENDRA SINGH RAJPUT	100	30	70	A	9	1	1	9
25	A60205222052	Ms APOORVA PATHAK	100	30	70	A	9	1	1	9
26	A60205222045	Mr ABHISHEK RAWAT	100	30	70	A-	8	1	1	8
27	A60205222049	Ms AVISHI SHRIVASTAVA	100	30	70	A	9	1	1	9
28	A60205222032	Mr DIVYANSHU PAL	100	30	70	B+	7	1	1	7
29	A60205222027	Ms ANUSHKA SHARMA	100	30	70	A+	10	1	1	10
30	A60205222073	Ms TANISHA RATHORE	100	30	70	A	9	1	1	9
31	A60205222017	Mr GOURAV JAT	100	30	70	A-	8	1	1	8
32	A60205222050	Mr ARYAN SAHU	100	30	70	A-	8	1	1	8
33	A60205222054	Mr KULDEEP	100	30	70	A	9	1	1	9

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Amity University Madhya Pradesh Gwalior

		SHARMA								
34	A60205222047	Mr SIDHARTH GUPTA	100	30	70	B+	7	1	1	7
35	A60205222059	Mr RAHUL SHARMA	100	30	70	A-	8	1	1	8
36	A60205222063	Mr PRANAV PRITAM	100	30	70	B	6	1	1	6
37	A60205222028	Mr PIYUSH TOMAR	100	30	70	DE	0	1	0	0
38	A60205222097	Ms PRIYA GOYAL	100	30	70	A-	8	1	1	8
39	A60205222026	Mr SANSKAR JAIN	100	30	70	A-	8	1	1	8
40	A60205222057	Mr ABHISHEK SINGH TOMAR	100	30	70	A-	8	1	1	8
41	A60205222072	Mr ROHIT SHARMA	100	30	70	A	9	1	1	9
42	A60205222051	Ms TANYA RAJ	100	30	70	A-	8	1	1	8
43	A60205222061	Mr ADITYA SIKARWAR	100	30	70	B+	7	1	1	7
44	A60205222095	Mr NEELESH RATHORE	100	30	70	B+	7	1	1	7
45	A60205222040	Mr SOMESH BARMAN	100	30	70	B	6	1	1	6
46	A60205222099	Mr RISHABH SINGH SIKARWAR	100	30	70	A-	8	1	1	8
47	A60205222029	Mr SARANSH JAIN	100	30	70	B+	7	1	1	7
48	A60205222062	Mr ANUPAM SHARMA	100	30	70	A-	8	1	1	8
49	A60205222074	Mr ADITYA PRATAP SINGH	100	30	70	A-	8	1	1	8
50	A60205222053	Mr AKASH SINGH	100	30	70	A	9	1	1	9
51	A60205222093	Mr NISHANT YADAV	100	30	70	A-	8	1	1	8
52	A60205222114	Mr R	100	30	70	A-	8	1	1	8

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Amity University Madhya Pradesh Gwalior

		KARTHIKEYAN								
53	A60205222042	Mr ABHISHEK SHARMA	100	30	70	A-	8	1	1	8
54	A60205222100	Ms SURABHI RATHORE	100	30	70	A-	8	1	1	8
55	A60205222034	Mr SAHIL UPADHYAY	100	30	70	A-	8	1	1	8
56	A60205222067	Mr ANURAG SHARMA	100	30	70	A-	8	1	1	8
57	A60205222078	Mr VIVEK SINGH TOMAR	100	30	70	B+	7	1	1	7
58	A60205222069	Mr NARENDRA SINGH BHADOURIYA	100	30	70	B+	7	1	1	7
59	A60205222094	Mr RUDRANSH SHARMA	100	30	70	B	6	1	1	6
60	A60205222127	Mr RUDRA PRATAP SINGH BHADORIYA	100	30	70	A	9	1	1	9
61	A60205222044	Mr AYUSH GIRI	100	30	70	A	9	1	1	9
62	A60205222106	Mr SUYASH GOYAL	100	30	70	A-	8	1	1	8
63	A60205222043	Mr AVIRAL BHADOURIA	100	30	70	A	9	1	1	9
64	A60205222075	Mr KRISHNA RAJ SINGH CHAUHAN	100	30	70	B+	7	1	1	7
65	A60205222086	Mr SHIVAM RATHORE	100	30	70	A	9	1	1	9
66	A60205222077	Mr DHRUV UPADHYAYA	100	30	70	B	6	1	1	6
67	A60205222116	Mr KRISHNA PRAJAPATI	100	30	70	A-	8	1	1	8
68	A60205222133	Mr MAYANK GOUR	100	30	70	A	9	1	1	9
69	A60205222056	Mr DEV SHIVHARE	100	30	70	A-	8	1	1	8
70	A60205222110	Ms ANUSHA	100	30	70	B	6	1	1	6

Director-ASET
Amity University Madhya Pradesh Gwalior

		SHARMA								
71	A60205222055	Ms ANANYA LIKHAR	100	30	70	A	9	1	1	9
72	A60205222083	Ms RUCHI SHARMA	100	30	70	A	9	1	1	9
73	A60205222105	Mr ANSHUL PANDEY	100	30	70	B+	7	1	1	7
74	A60205222085	Ms KOMOLIKA AGARWAL	100	30	70	A	9	1	1	9
75	A60205222128	Ms DISHA SARASWAT	100	30	70	A	9	1	1	9
76	A60205222136	Ms SWASTI AGARWAL	100	30	70	A	9	1	1	9
77	A60205222058	Mr GOPAL UPADHYAY	100	30	70	A	9	1	1	9
78	A60205222112	Ms NANDINI BISWAS	100	30	70	A	9	1	1	9
79	A60205222060	Mr HARI OM RAI	100	30	70	B+	7	1	1	7
80	A60205222101	Mr SAURAV SONI	100	30	70	B	6	1	1	6
81	A60205222113	Mr ADITYA PARMAR	100	30	70	B	6	1	1	6
82	A60205222087	Mr YUVRAJ SINGH CHAUDHARY	100	30	70	A-	8	1	1	8
83	A60205222130	Mr ADITYA JAIN	100	30	70	A-	8	1	1	8
84	A60205222142	Mr RUMMAN PARVEZ	100	30	70	A	9	1	1	9
85	A60205222076	Ms VAISHALI JHA	100	30	70	A	9	1	1	9
86	A60205222119	Mr ANSH LITAURIYA	100	30	70	B+	7	1	1	7
87	A60205222065	Mr ARJUN PRATAP SINGH TOMAR	100	30	70	B	6	1	1	6
88	A60205222108	Mr ROHIT	100	30	70	A-	8	1	1	8

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Amity University Madhya Pradesh Gwalior

		SHARMA								
89	A60205222125	Mr AVIJIT SHARMA	100	30	70	A-	8	1	1	8
90	A60205222124	Mr JEETU SINGH	100	30	70	A-	8	1	1	8
91	A60205222135	Mr ARVIND SINGH TOMAR	100	30	70	A-	8	1	1	8
92	A60205222159	Mr VAIBHAV SINGH CHANDEL	100	30	70	B	6	1	1	6
93	A60205222082	Ms SNEHA TIWARI	100	30	70	A	9	1	1	9
94	A60205222120	Mr ARYAN KUSHWAH	100	30	70	A-	8	1	1	8
95	A60205222081	Mr RISHAB SINGH	100	30	70	A-	8	1	1	8
96	A60205222117	Mr SUNNY SHRIVASTAVA	100	30	70	B+	7	1	1	7
97	A60205222138	Mr VIKRAM DEV BHADORIYA	100	30	70	B+	7	1	1	7
98	A60205222126	Mr KUSHANK BANSAL	100	30	70	A-	8	1	1	8
99	A60205222140	Mr HIMANSH SINGH KUSHWAH	100	30	70	A-	8	1	1	8
100	A60205222175	Ms PRITIKA	100	30	70	A	9	1	1	9
101	A60205222088	Mr HIMANSHU PARMAR	100	30	70	B	6	1	1	6
102	A60205222122	Mr YUVRAJ SINGH PALI	100	30	70	B+	7	1	1	7
103	A60205222091	Mr DHEERENDRA SINGH CHAUHAN	100	30	70	B	6	1	1	6
104	A60205222118	Mr DHEERAJ KUNDWANI	100	30	70	A	9	1	1	9
105	A60205222147	Ms ANJALI CHAUHAN	100	30	70	A-	8	1	1	8

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Amity University Madhya Pradesh Gwalior

106	A60205222145	Mr HIMANSHU KUMAR	100	30	70	A-	8	1	1	8
107	A60205222177	Ms ANJALI SHARMA	100	30	70	A	9	1	1	9
108	A60205222186	Mr SAGAR MEENA	100	30	70	B-	5	1	1	5
109	A60205222090	Mr AJAY RATHOR	100	30	70	B+	7	1	1	7
110	A60205222129	Mr YOGESH SHRIVASTAVA	100	30	70	B	6	1	1	6
111	A60205222098	Mr ABHISHEK SINGH TOMAR	100	30	70	B	6	1	1	6
112	A60205222143	Mr AYUSH SINGH BHADORIA	100	30	70	A-	8	1	1	8
113	A60205222151	Mr HITESH SINGH CHAUHAN	100	30	70	A-	8	1	1	8
114	A60205222148	Mr MANISH BANSAL	100	30	70	A	9	1	1	9
115	A60205222219	Mr AMAN SINGH TOMAR	100	30	70	B+	7	1	1	7
116	A60205222218	Mr KANISHK BAJPAI	100	30	70	A-	8	1	1	8
117	A60205222109	Ms GUNGUN TRIPATHI	100	30	70	A	9	1	1	9
118	A60205222137	Mr MANTHAN SHEKHAWAT	100	30	70	B+	7	1	1	7
119	A60205222103	Ms SONALI DEB	100	30	70	A-	8	1	1	8
120	A60205222153	Ms ANANYA JAIN	100	30	70	B	6	1	1	6
121	A60205222164	Mr SAKIB KHAN	100	30	70	B+	7	1	1	7
122	A60205222150	Ms SHIVANI GUPTA	100	30	70	A	9	1	1	9
123	A60205222223	Ms KRATIKA RAJAWAT	100	30	70	B	6	1	1	6

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Amity University Madhya Pradesh Gwalior

124	A60205222224	Mr ADIT RAJPUT	100	30	70	A	9	1	1	9
125	A60205222123	Mr ISHANT RATHORE	100	30	70	B	6	1	1	6
126	A60205222139	Ms BEEMIREDDY KEERTHI PRIYA	100	30	70	A-	8	1	1	8
127	A60205222107	Mr VIKESH JHA	100	30	70	A-	8	1	1	8
128	A60205222163	Mr PRATEEK JAISWAL	100	30	70	B-	5	1	1	5
129	A60205222171	Ms PRAGATI BHADORIA	100	30	70	B	6	1	1	6
130	A60205222165	Ms SHITAKSHI SINGH SIKARWAR	100	30	70	B-	5	1	1	5
131	A60205222229	Mr MANVENDRA SIKARWAR	100	30	70	A-	8	1	1	8
132	A60205222227	Ms ARPITA DHAKAD	100	30	70	A-	8	1	1	8
133	A60205222132	Mr MOHIT SINGH	100	30	70	A-	8	1	1	8
134	A60205222152	Ms PALAK GUPTA	100	30	70	B	6	1	1	6
135	A60205222111	Ms SOMYA SHARMA	100	30	70	A	9	1	1	9
136	A60205222176	Mr MAHENDRA SINGH	100	30	70	A-	8	1	1	8
137	A60205222196	Mr LAVYANSH JAIN	100	30	70	B	6	1	1	6
138	A60205222167	Mr RAMAN SHARMA	100	30	70	A-	8	1	1	8
139	A60205222230	Mr AVISHEK SINGH	100	30	70	A-	8	1	1	8
140	A60205222236	Mr KAUSHAL SINGH RANA	100	30	70	A-	8	1	1	8
141	A60205222146	Mr AMAN PANDEY	100	30	70	A-	8	1	1	8

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Amity University Madhya Pradesh Gwalior

142	A60205222154	Ms SHREEJI TIWARI	100	30	70	A+	10	1	1	10
143	A60205222121	Ms ARADHYA YADAV	100	30	70	A-	8	1	1	8
144	A60205222181	Mr AYUSH MISHRA	100	30	70	B+	7	1	1	7
145	A60205222201	Ms SHRADDHA KUSHWAH	100	30	70	A	9	1	1	9
146	A60205222184	Mr UDAY PRATAP SINGH SIKARWAR	100	30	70	B-	5	1	1	5
147	A60205222235	Mr ASTIK GUPTA	100	30	70	A	9	1	1	9
148	A60205222240	Ms RITIKA NAINANI	100	30	70	A-	8	1	1	8
149	A60205222149	Ms KIRTI PATHAK	100	30	70	A-	8	1	1	8
150	A60205222156	Mr NEETESH SHARMA	100	30	70	B	6	1	1	6
151	A60205222134	Mr NIKIT PATHAK	100	30	70	A	9	1	1	9
152	A60205222182	Mr GUNVEER SINGH SALUJA	100	30	70	B	6	1	1	6
153	A60205222207	Mr ALOK DIXIT	100	30	70	B-	5	1	1	5
154	A60205222197	Mr SACHIN SHRIVAS	100	30	70	A	9	1	1	9
155	A60205222242	Ms PRATIBHA AGRAWAL	100	30	70	A	9	1	1	9
156	A60205222266	Mr SHUBHAM DHAKAD	100	30	70	A	9	1	1	9
157	A60205222162	Ms UNNATI SARASWAT	100	30	70	B	6	1	1	6
158	A60205222169	Mr SAKSHAM JAIN	100	30	70	A	9	1	1	9
159	A60205222155	Mr VIKASH YADAV	100	30	70	B-	5	1	1	5
160	A60205222192	Mr MANISH RAJ	100	30	70	B-	5	1	1	5

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Amity University Madhya Pradesh Gwalior

161	A60205222211	Ms ASTHA GUPTA	100	30	70	B	6	1	1	6
162	A60205222200	Mr MOHAMMAD ARSHAAN	100	30	70	A	9	1	1	9
163	A60205222243	Mr MADHUP SHARMA	100	30	70	A	9	1	1	9
164	A60205222269	Mr AYUSH RAJ SINGH	100	30	70	B+	7	1	1	7
165	A60205222179	Ms SNEHA PANDEY	100	30	70	A-	8	1	1	8
166	A60205222170	Mr GAURAV KUMAR	100	30	70	A-	8	1	1	8
167	A60205222168	Mr KRISHNA KUSHWAH	100	30	70	B+	7	1	1	7
168	A60205222202	Ms ATIRA YAMEEN	100	30	70	B	6	1	1	6
169	A60205222213	Mr DEV SHARMA	100	30	70	A-	8	1	1	8
170	A60205222206	Mr PIYUSH RANJAN	100	30	70	B+	7	1	1	7
171	A60205222267	Ms ANIKA MANJHI	100	30	70	A-	8	1	1	8
172	A60205222283	Mr SOURABH SONI	100	30	70	B+	7	1	1	7
173	A60205222180	Mr PRANJAL RAJ	100	30	70	A	9	1	1	9
174	A60205222193	Mr DAMODAR YADAV	100	30	70	A-	8	1	1	8
175	A60205222178	Mr ARSHAD RAZA	100	30	70	B	6	1	1	6
176	A60205222225	Mr VEDANSH SHRIVASTAVA	100	30	70	B-	5	1	1	5
177	A60205222221	Mr LAKSHYA PENDHARKAR	100	30	70	B-	5	1	1	5
178	A60205222210	Mr VIVEK KUMAR MUKESH SHRIVAS	100	30	70	B-	5	1	1	5

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Amity University Madhya Pradesh Gwalior

179	A60205222268	Mr SURJEET KARAN	100	30	70	B-	5	1	1	5
180	A60205222284	Mr KARTIKEY SINGH BHADAURIYA	100	30	70	A-	8	1	1	8
181	A60205222183	Mr ABHISHEK TIWARI	100	30	70	B	6	1	1	6
182	A60205222199	Ms NISHTHA RAWAT	100	30	70	A	9	1	1	9
183	A60205222188	Mr AMAN KUMAR RAJAWAT	100	30	70	B-	5	1	1	5
184	A60205222232	Mr VAIBHAV PRATAP SINGH KUSHWAH	100	30	70	C+	4	1	1	4
185	A60205222252	Mr SUMIT PATHWAR	100	30	70	B-	5	1	1	5
186	A60205222216	Mr DIVYAKANT MISHRA	100	30	70	B-	5	1	1	5
187	A60205222282	Mr PIYUSH SEN	100	30	70	B	6	1	1	6
188	A60205222310	Ms RIYA SINGH	100	30	70	A	9	1	1	9
189	A60205222185	Mr MOHAMMAD KAISH KHAN	100	30	70	B+	7	1	1	7
190	A60205222204	Ms ANUSHKA SAXENA	100	30	70	B	6	1	1	6
191	A60205222191	Mr PRASHANT SINGH TOMAR	100	30	70	B+	7	1	1	7
192	A60205222233	Ms SHAILY GUPTA	100	30	70	A	9	1	1	9
193	A60205222254	Mr AMIT SINGH TOMAR	100	30	70	A-	8	1	1	8
194	A60205222222	Mr ABHAY GOUD	100	30	70	B+	7	1	1	7
195	A60205222291	Mr ANURAG SHARMA	100	30	70	B-	5	1	1	5
196	A60205222320	Mr NIHAL SINGH	100	30	70	A-	8	1	1	8

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Amity University Madhya Pradesh Gwalior

		CHAUHAN								
197	A60205222189	Mr YASH DUBEY	100	30	70	B-	5	1	1	5
198	A60205222226	Mr NAMAN GUPTA	100	30	70	A-	8	1	1	8
199	A60205222194	Ms YASHI GUPTA	100	30	70	A	9	1	1	9
200	A60205222239	Ms SONALI SENGAR	100	30	70	B	6	1	1	6
201	A60205222261	Mr ABHISHEK SHARMA	100	30	70	B-	5	1	1	5
202	A60205222237	Mr ANUJ SINGH BHADAURIYA	100	30	70	A-	8	1	1	8
203	A60205222294	Ms SHANYA CHAUHAN	100	30	70	B+	7	1	1	7
204	A60205222337	Mr SIDDHANT SHARMA	100	30	70	B+	7	1	1	7
205	A60205222190	Mr KANISHK DEORA	100	30	70	B-	5	1	1	5
206	A60205222231	Mr MANAV SHRIVASTAVA	100	30	70	B	6	1	1	6
207	A60205222205	Ms PARI SINGH	100	30	70	A	9	1	1	9
208	A60205222244	Mr RAVINDRA RAJAK	100	30	70	A-	8	1	1	8
209	A60205222273	Mr MAYANK SONI	100	30	70	B	6	1	1	6
210	A60205222251	Mr RAHUL RAJPOOT	100	30	70	C+	4	1	1	4
211	A60205222309	Mr DEVANSH KAKWANI	100	30	70	B	6	1	1	6
212	A60205222353	Mr MANN SHARMA	100	30	70	A-	8	1	1	8
213	A60205222203	Mr ANAS KHAN	100	30	70	A	9	1	1	9
214	A60205222234	Ms ANUSHA UPADHYAY	100	30	70	B-	5	1	1	5
215	A60205222228	Mr SAMBHAV	100	30	70	B+	7	1	1	7

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Amity University Madhya Pradesh Gwalior

		AGARWAL								
216	A60205222265	Ms NIHARIKA MISHRA	100	30	70	A	9	1	1	9
217	A60205222275	Mr ANUJ RAJPUT	100	30	70	B-	5	1	1	5
218	A60205222260	Mr AJAY PRATAP TOMAR	100	30	70	B-	5	1	1	5
219	A60205222311	Mr ADITYA SHARMA	100	30	70	A	9	1	1	9
220	A60205222360	Mr RISHABH LAVANIA	100	30	70	A-	8	1	1	8
221	A60205222215	Mr ARYAN SINGH BAIS	100	30	70	B+	7	1	1	7
222	A60205222247	Ms PALLAVI MISHRA	100	30	70	B+	7	1	1	7
223	A60205222246	Mr VIVEK TYAGI	100	30	70	B-	5	1	1	5
224	A60205222278	Mr NITIN RAJPUT	100	30	70	A	9	1	1	9
225	A60205222296	Ms IRAM FATIMA	100	30	70	B+	7	1	1	7
226	A60205222274	Mr VIVEK DHAKAR	100	30	70	B-	5	1	1	5
227	A60205222315	Mr VAIBHAV PURWAR	100	30	70	A-	8	1	1	8
228	A60205222290	Mr AMIT RAJPUT	100	30	70	A-	8	1	1	8
229	A60205222217	Mr SHIVKUMAR SINGH RAJAWAT	100	30	70	A-	8	1	1	8
230	A60205222253	Mr SHAURYA GUPTA	100	30	70	B	6	1	1	6
231	A60205222256	Mr AKASH JADON	100	30	70	B	6	1	1	6
232	A60205222295	Mr PUSHPENDRA KUMAR	100	30	70	A-	8	1	1	8

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		SHARMA								
233	A60205222302	Mr NAITIK SINGH	100	30	70	B+	7	1	1	7
234	A60205222276	Mr ARJUN CHHAWARI	100	30	70	C+	4	1	1	4
235	A60205222322	Ms GRACY SINGH TOMAR	100	30	70	A-	8	1	1	8
236	A60205222308	Mr ANIRUDHA SINGH TOMAR	100	30	70	B+	7	1	1	7
237	A60205222238	Mr ZUBAIR	100	30	70	B-	5	1	1	5
238	A60205222255	Mr PRADEEP SINGH GURJAR	100	30	70	B-	5	1	1	5
239	A60205222258	Mr HARDIK CHANDRA	100	30	70	B-	5	1	1	5
240	A60205222314	Ms DEEPIKA	100	30	70	B+	7	1	1	7
241	A60205222304	Mr AMAN SINGH TOMAR	100	30	70	B+	7	1	1	7
242	A60205222280	Mr SHIVAM KUMAR SINGH	100	30	70	B-	5	1	1	5
243	A60205222338	Mr PRASHANT UPADHYAY	100	30	70	A-	8	1	1	8
244	A60205222321	Ms BHADORIA SWASTIKA JITENDRA SINGH	100	30	70	B+	7	1	1	7
245	A60205222245	Mr PRASHANT KUMAR	100	30	70	B-	5	1	1	5
246	A60205222272	Mr ESHAN SHARMA	100	30	70	A-	8	1	1	8
247	A60205222263	Mr VINAYAK CHATURVEDI	100	30	70	B+	7	1	1	7
248	A60205222335	Mr ANUJ SHARMA	100	30	70	B+	7	1	1	7
249	A60205222328	Mr KESHRI SINGH RAJAWAT	100	30	70	A	9	1	1	9
250	A60205222297	Mr HARSH VARDHAN SINGH	100	30	70	B-	5	1	1	5

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		BHADORIA								
251	A60205222372	Ms PRIYA KAPOOR	100	30	70	B+	7	1	1	7
252	A60205222358	Ms DEEPTI EKKA	100	30	70	A	9	1	1	9
253	A60205222250	Mr MRATYUNJAY SHARMA	100	30	70	B-	5	1	1	5
254	A60205222305	Mr NITANT RAJ TIWARI	100	30	70	B	6	1	1	6
255	A60205222271	Ms LEKHNI KUMBHARE	100	30	70	A-	8	1	1	8
256	A60205222365	Mr NISHANT SINGH	100	30	70	A	9	1	1	9
257	A60205222330	Mr GOVIND KUMAR JHA	100	30	70	B+	7	1	1	7
258	A60205222299	Ms DISHA AGRAWAL	100	30	70	B	6	1	1	6
259	A60205222285	Ms KANAN GUPTA	100	30	70	A-	8	1	1	8
260	A60205222307	Mr KAUSHAL SHARMA	100	30	70	B+	7	1	1	7
261	A60205222257	Ms BHOOMI JAIN	100	30	70	B	6	1	1	6
262	A60205222301	Mr RUDRESH BHARDWAJ	100	30	70	B+	7	1	1	7
263	A60205222286	Mr VIVEK SHARMA	100	30	70	B+	7	1	1	7
264	A60205222324	Mr NAVEEN KUMAR	100	30	70	A+	10	1	1	10
265	A60205222332	Ms MANYA GUPTA	100	30	70	A-	8	1	1	8
266	A60205222303	Mr RISHI TIWARI	100	30	70	B-	5	1	1	5
267	A60205222306	Ms SNEHA MASTAGAR	100	30	70	B-	5	1	1	5
268	A60205222326	Mr ABHISHEK TRIPATHI	100	30	70	B	6	1	1	6

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269	A60205222262	Mr ADITYA SINGH BHADORIYA	100	30	70	B+	7	1	1	7
270	A60205222318	Mr ANMOL BOHARE	100	30	70	B	6	1	1	6
271	A60205222323	Mr ADITYA SHARMA	100	30	70	A-	8	1	1	8
272	A60205222329	Mr SUMIT SHARMA	100	30	70	A	9	1	1	9
273	A60205222366	Mr SOMESHWAR BAREWAR	100	30	70	A-	8	1	1	8
274	A60205222331	Mr ABHIJEET KUMAR PANDEY	100	30	70	B+	7	1	1	7
275	A60205222333	Mr JATIN JAIN	100	30	70	A-	8	1	1	8
276	A60205222346	Mr DEVANSH DIWEDI	100	30	70	B	6	1	1	6
277	A60205222264	Mr MAKHAN CHAUHAN	100	30	70	B-	5	1	1	5
278	A60205222344	Mr PRASHANT MISHRA	100	30	70	A	9	1	1	9
279	A60205222341	Mr VISHRUT SINGH DHAKRE	100	30	70	A	9	1	1	9
280	A60205222347	Mr RISHAV GUPTA	100	30	70	B+	7	1	1	7
281	A60205222368	Ms ANAM KHAN	100	30	70	A-	8	1	1	8
282	A60205222351	Mr ABHAY PRATAP SINGH BHADORIA	100	30	70	B+	7	1	1	7
283	A60205222345	Ms ANKITA PATHAK	100	30	70	A	9	1	1	9
284	A60205222357	Mr DHRUV GUPTA	100	30	70	A-	8	1	1	8
285	A60205222270	Mr VASUDEO PANDEY	100	30	70	A-	8	1	1	8
286	A60205222367	Ms JOYA KHAN	100	30	70	A-	8	1	1	8

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287	A60205222348	Mr SHIVAM SHARMA	100	30	70	A	9	1	1	9
288	A60205222369	Ms ANSHIKA SIKARWAR	100	30	70	A	9	1	1	9
289	A60205222277	Mr ARUN SHARMA	100	30	70	B	6	1	1	6
290	A60205222370	Mr AVNISH KUMAR	100	30	70	B+	7	1	1	7
291	A60205222363	Mr JATIN GOYAL	100	30	70	A	9	1	1	9
292	A60205222287	Mr SURYAVEER SINGH GURJAR	100	30	70	A	9	1	1	9
293	A60205222298	Ms SHREYA	100	30	70	B-	5	1	1	5
294	A60205222300	Ms KHUSHI PAL	100	30	70	B-	5	1	1	5
295	A60205222334	Mr MOHIT SINGH	100	30	70	A-	8	1	1	8
296	A60205222350	Ms PRIYA RAJPUT	100	30	70	A	9	1	1	9
297	A60205222356	Mr AMAN SHUKLA	100	30	70	A	9	1	1	9
298	A60205222364	Ms MAHI JAIN	100	30	70	A-	8	1	1	8

Average Grade Point = 2044 /298 (Total Grade point/Total no of students) =6.8

No of students getting greater than average (6.8) marks = 221 students = 74.16

Total No. of Students	=	298

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Level 3	> 60% Average marks	74.16
Attainment Level		Level 3

Note: Attainment Level

Level 1	<50% - Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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AMITY UNIVERSITY

MADHYA PRADESH

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

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course: DESIGN AND ANALYSIS OF ALGORITHMS LAB
Course Code : **CSE 323**, Crédits : 01, Session :2023-24(Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name: Dr. Samta Jain Goyal

A. **Introduction:** The objective of this course is to develop Ability to write programs in java to solve problems using algorithm design techniques such as Divide and Conquer, Greedy, Dynamic programming, and Backtracking.

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

CSE323.1. Understand Various soring algorithms.

CSE323.2. Analyze and implement different tree traversing techniques.

CSE323.3. Implement Backtracking technique to solve some problems.

CSE323.4. Implement various shortest path algorithms.

CSE323.5. Apply dynamic programming to solve problems.

C. Program Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the profes

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PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. 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.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. **Program Specific Outcomes:**

PSO1. Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur and a zest for higher studies.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term Viva	CT	15%
	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 Sem	End Semester Examination	EE	70%

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Examination			
Total			**100%**

F.

***F*. List of experiments/demonstrations**

1. Write a program to implement Quick sort algorithm for sorting a list of integers in ascending order,
2. Write a program to implement Merge sort algorithm for sorting a list of integers in ascending order.
3. i) Write a program to implement the DFS algorithm for a graph.
   ii) Write a program to implement the BFS algorithm for a graph.
4. Write a program to implement backtracking algorithm for the N-queens problem.
5. Write a program to implement the backtracking algorithm for the sum of subsets problem.
6. Write a program to implement the backtracking algorithm for the Hamiltonian Circuits problem.
7. Write a program to implement greedy algorithm for job sequencing with deadlines.
8. Write a program to implement Dijkstra's algorithm for the Single source shortest path problem.
9. Write a program that implements Prim's algorithm to generate minimum cost spanning tree.
10. Write a program that implements Kruskal's algorithm to generate minimum cost spanning tree.
11. Write a program to implement Dynamic Programming algorithm for the 0/1 Knapsack.

Examination Scheme:

IA			EE			
A	**PR**	**Practical Based Test**	**Major Experiment**	**Minor Experiment**	**LR**	**Viva**
5	10	15	35	15	10	10

Note: IA- Internal Assessment, EE- External Exam, A-Attendance, PR- Performance, LR- Lab Record, V-Viva.

2. Suggested Text/Reference Books:

- Algorithm Design, Jon Kleinberg and Eva Tardos, Pearson Education.
- Introduction to Algorithms: A Creative Approach, Udi Manber, Pearson Education.
- Data structures with C++, John R. Hubbard, Schaum's Outlines, TMH.
- Data structures and algorithms in Java, 2nd Edition, R. Lafore, Pearson Education.
- Data Structures using C++, D S Malik, Cengage Learning.

3. Lab Plan

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Practical	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Write a program to implement Quick sort algorithm for sorting a list of integers in ascending order.	Practical	CSE323.1	Mid Term-1, Quiz & End Sem Exam
2	Write a program to implement Merge sort algorithm for sorting a list of integers in ascending order.	Practical	CSE323.1	Mid Term-1, Quiz & End Sem Exam
3	Write a program to implement the DFS algorithm for a graph. ii) Write a program to implement the BFS algorithm for a graph	Practical	CSE323.1	Mid Term-1, Quiz & End Sem Exam
4	Write a program to implement backtracking algorithm for the N-queens problem.	Practical	CSE323.1	Mid Term-1, Quiz & End Sem Exam
5	Write a program to implement the backtracking algorithm for the sum of subsets problem.	Practical	CSE323.1	Mid Term-1, Quiz & End Sem Exam

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6	Write a program to implement the backtracking algorithm for the Hamiltonian Circuits problem.	Practical	CSE323.2	Mid Term-1, Quiz & End Sem Exam
7	Write a program to implement greedy algorithm for job sequencing with deadlines.	Practical	CSE323.2	Mid Term-1, Quiz & End Sem Exam
8	Write a program to implement Dijkstra's algorithm for the Single source shortest path problem.	Practical	CSE323.3	Mid Term-1, Quiz & End Sem Exam
9	Write a program that implements Prim's algorithm to generate minimum cost spanning tree.	Practical	CSE323.3	Mid Term-1, Quiz & End Sem Exam
10	Write a program that implements Kruskal's algorithm to generate minimum cost spanning tree.	Practical	CSE323.4	Mid Term-1, Quiz & End Sem Exam
11	Write a program to implement Dynamic Programming algorithm for the 0/1 Knapsack.	Practical	CSE323.5	Mid Term-1, Quiz & End Sem Exam

4.

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME-SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE323.1	Understand and implement Various sor	2														

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	ingalgorithms.															
CSE3233.2	Analyzeandimplementdifferentreetrave	3	2											1		

	r s i n g t e c h n i q u e s .															
C S E 3 2 3 . 3	Implement Backtracking technique to solve some problems.	3												1		
C S E 3 2 3 . 4	Implement various shortest path algorithms.	3												1		
C S E 3	Apply dynami	3														

2.5	c programming to solve problems.															

ATTAINMENT

ESE Marks – CSE 323, DESIGN AND ANALYSIS OF ALGORITHMS LAB

S. No.	Enrollment.No.	Student's Name	CSE323 DESIGN AND ANALYSIS OF ALGORITHMS LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U4G4
1	A60205221001	Mr MARAMREDDY ASHISH KUMAR REDDY	100	30	70	B+	7	1	1	7
2	A60205221003	Mr SANJAY KUSHWAH	100	30	70	B+	7	1	1	7
3	A60205221007	Mr SUYASH DESHMUKH	100	30	70	B	6	1	1	6
4	A60205221046	Mr YASIR KHAN	100	30	70	B	6	1	1	6
5	A60205221057	Mr MIRIYAM HEMANTH KUMAR	100	30	70	B+	7	1	1	7
6	A60205221009	Mr PRANSHUL SHARMA	100	30	70	B	6	1	1	6
7	A60205221016	Mr HARSHIT SHARMA	100	30	70	B+	7	1	1	7
8	A60205221021	Mr DHARMENDRA DIWAKAR	100	30	70	B-	5	1	1	5

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9	A60205221034	Mr TARUN SINGH TOMAR	100	30	70	B+	7	1	1	7
10	A60205221036	Ms KARTIKA CHAUHAN	100	30	70	B+	7	1	1	7
11	A60205221010	Mr VANSH GUPTA	100	30	70	B+	7	1	1	7
12	A60205221031	Ms MANYATA SINGH	100	30	70	B	6	1	1	6
13	A60205221033	Mr SANDEEP SHARMA	100	30	70	A	9	1	1	9
14	A60205221071	Ms SWATI GUPTA	100	30	70	B	6	1	1	6
15	A60205221081	Mr DEVANSH VERMA	100	30	70	B+	7	1	1	7
16	A60205221013	Ms PEARL BANSAL	100	30	70	B	6	1	1	6
17	A60205221023	Mr VIVEK YADAV	100	30	70	B+	7	1	1	7
18	A60205221025	Mr YASH SHARMA	100	30	70	B-	5	1	1	5
19	A60205221026	Ms PRAGYA GUPTA	100	30	70	F	0	1	0	0
20	A60205221038	Ms VANDANA	100	30	70	B	6	1	1	6
21	A60205221002	Mr VEDANT GUPTA	100	30	70	B+	7	1	1	7
22	A60205221004	Mr VISHAL KUMAR	100	30	70	B	6	1	1	6
23	A60205221022	Mr SANSKAR SONI	100	30	70	B	6	1	1	6
24	A60205221029	Mr PRIYANSHU KUMAR	100	30	70	B-	5	1	1	5
25	A60205221047	Mr ANUSH M K	100	30	70	B-	5	1	1	5
26	A60205221005	Mr ANURAG SINGH RANA	100	30	70	B-	5	1	1	5
27	A60205221011	Ms ANDREA NARCIS	100	30	70	A-	8	1	1	8

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28	A60205221039	Ms MUSKAN BANSAL	100	30	70	B+	7	1	1	7
29	A60205221051	Mr VIPUL KUMAR	100	30	70	B	6	1	1	6
30	A60205221066	Mr HARSHAVARDHAN CHEVADABOINA	100	30	70	B	6	1	1	6
31	A60205221020	Mr HARSH RAJ SINGH CHAUHAN	100	30	70	B	6	1	1	6
32	A60205221035	Mr BIKASH NATH	100	30	70	B-	5	1	1	5
33	A60205221041	Mr ARYAN SINGH TOMAR	100	30	70	B+	7	1	1	7
34	A60205221052	Mr ABHINAV KUMAR	100	30	70	A-	8	1	1	8
35	A60205221061	Mr DEEPENDRA SHARMA	100	30	70	A-	8	1	1	8
36	A60205221012	Mr ROHIT SHARMA	100	30	70	B	6	1	1	6
37	A60205221018	Mr SAHIL KHAN	100	30	70	A-	8	1	1	8
38	A60205221024	Ms MEGHNA GUPTA	100	30	70	B+	7	1	1	7
39	A60205221027	Ms SIMRAN SINGH	100	30	70	A-	8	1	1	8
40	A60205221042	Ms KRATI GOYAL	100	30	70	B-	5	1	1	5
41	A60205221059	Mr AYUSH TOMAR	100	30	70	B+	7	1	1	7
42	A60205221068	Ms SHRUTI AGARWAL	100	30	70	B-	5	1	1	5
43	A60205221080	Mr ABHISHEK SHARMA	100	30	70	B	6	1	1	6
44	A60205221082	Mr MOKSH TIWARI	100	30	70	B+	7	1	1	7
45	A60205221094	Ms PURVI GUPTA	100	30	70	B	6	1	1	6
46	A60205221040	Mr SHOBHIT CHATURVEDI								

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47	A60205221062	Mr MAYANK BOHARE	100	30	70	B-	5	1	1	5
48	A60205221074	Ms SHATAKSHI SHARMA	100	30	70	B	6	1	1	6
49	A60205221075	Mr SHUBHAM GOYAL	100	30	70	B+	7	1	1	7
50	A60205221087	Mr KONJETI MOHAN SAI AKHIL	100	30	70	B-	5	1	1	5
51	A60205221099	Mr MANAV PRATAP SINGH TOMAR	100	30	70	A-	8	1	1	8
52	A60205221101	Mr ANUBHAV KHANDELWAL	100	30	70	B+	7	1	1	7
53	A60205221111	Ms VAISHALI PATEL	100	30	70	A-	8	1	1	8
54	A60205221131	Mr SHIVANK SINGH BHADAURIA	100	30	70	B	6	1	1	6
55	A60205221137	Ms SNEHA GUPTA	100	30	70	A-	8	1	1	8
56	A60205221054	Mr HIMANSHU SINGH	100	30	70	B	6	1	1	6
57	A60205221056	Mr MORUBOYINA VENKATA SAI AKHIL	100	30	70	B+	7	1	1	7
58	A60205221063	Mr ADESH TIWARI	100	30	70	B	6	1	1	6
59	A60205221065	Mr ABHISHEK SINGH	100	30	70	B-	5	1	1	5
60	A60205221078	Ms ISHU KUSHWAH	100	30	70	B	6	1	1	6
61	A60205221055	Mr SHIVAM SINGH TOMAR	100	30	70	B	6	1	1	6
62	A60205221058	Mr AYUSH SHARMA	100	30	70	B-	5	1	1	5
63	A60205221069	Mr LOVE KUMAR	100	30	70	B-	5	1	1	5
64	A60205221085	Mr HRISHI SHARMA	100	30	70	A-	8	1	1	8
65	A60205221095	Mr SURAJ SINGH TOMAR								

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66	A60205221077	Mr BADAL KUSHWAH	100	30	70	A	9	1	1	9
67	A60205221091	Mr YUVRAJ SINGH PARIHAR	100	30	70	A	9	1	1	9
68	A60205221098	Mr SUYASH PATHAK	100	30	70	B	6	1	1	6
69	A60205221126	Mr VISHNU SHARMA	100	30	70	A-	8	1	1	8
70	A60205221132	Mr KISHAN RATHORE	100	30	70	B+	7	1	1	7
71	A60205221073	Mr UTKARSH BHADORIA	100	30	70	B+	7	1	1	7
72	A60205221076	Mr AKSHAT SHRIVASTAVA	100	30	70	A	9	1	1	9
73	A60205221088	Mr CHIRAG SISODIYA	100	30	70	B	6	1	1	6
74	A60205221106	Mr ROHAN RAKSHIT	100	30	70	B-	5	1	1	5
75	A60205221109	Mr DODLA AJAY KUMAR	100	30	70	A-	8	1	1	8
76	A60205221053	Mr AYUSH SHARMA	100	30	70	B+	7	1	1	7
77	A60205221064	Ms NIKHAT FATIMA	100	30	70	B	6	1	1	6
78	A60205221079	Mr PRIYANSHU TANGAR	100	30	70	A	9	1	1	9
79	A60205221083	Mr RAJ SHARMA	100	30	70	A-	8	1	1	8
80	A60205221089	Ms VANSHIKA SISODIYA	100	30	70	A-	8	1	1	8
81	A60205221100	Mr ANMOL KUMAR	100	30	70	B+	7	1	1	7
82	A60205221116	Mr ISHAAN DHINGRA	100	30	70	B+	7	1	1	7
83	A60205221129	Mr AJAY PARIHAR	100	30	70	B+	7	1	1	7

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84	A60205221148	Ms SWETA	100	30	70	A-	8	1	1	8
85	A60205221161	Ms KHUSHI SHARMA	100	30	70	A-	8	1	1	8
86	A60205221107	Mr ANURAG SINGH BHADORIA	100	30	70	B-	5	1	1	5
87	A60205221108	Ms VEDIKA YERUNKAR	100	30	70	B+	7	1	1	7
88	A60205221112	Ms SMRUTI SRADHA JENA	100	30	70	A-	8	1	1	8
89	A60205221123	Mr NARENDRA SINGH YADAV	100	30	70	B	6	1	1	6
90	A60205221127	Mr MADHUR GUPTA	100	30	70	B+	7	1	1	7
91	A60205221147	Mr YASH KUMAR SAH	100	30	70	B+	7	1	1	7
92	A60205221162	Mr DEVANSH CHATURVEDI	100	30	70	B+	7	1	1	7
93	A60205221164	Mr SATISH KUMAR	100	30	70	B+	7	1	1	7
94	A60205221179	Mr GAURAV SINGH	100	30	70	A	9	1	1	9
95	A60205221198	Ms PRIYA SINGH TOMAR	100	30	70	B	6	1	1	6
96	A60205221202	Ms K. SUKESHINI	100	30	70	B+	7	1	1	7
97	A60205221212	Ms SNEHA BHADOURIYA	100	30	70	B	6	1	1	6
98	A60205221217	Mr AYUSH SINGH	100	30	70	B+	7	1	1	7
99	A60205221219	Mr NIKHIL SHARMA	100	30	70	B-	5	1	1	5
100	A60205221223	Mr ANUJ CHAURASIYA	100	30	70	A	9	1	1	9
101	A60205221084	Mr DEVESH SHRIVAS	100	30	70	B+	7	1	1	7

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102	A60205221086	Mr SANDEEP YADAV	100	30	70	B+	7	1	1	7
103	A60205221090	Mr SAKSHAM JAIN	100	30	70	B+	7	1	1	7
104	A60205221092	Mr JAIDEEP SHARMA	100	30	70	A	9	1	1	9
105	A60205221096	Mr ADITYA PRATAP SINGH	100	30	70	B	6	1	1	6
106	A60205221102	Mr PANKAJ KUMAR	100	30	70	B+	7	1	1	7
107	A60205221120	Mr KUNAL RATHORE	100	30	70	B+	7	1	1	7
108	A60205221125	Mr NISHANT RAJPUT	100	30	70	B	6	1	1	6
109	A60205221130	Mr GARVIT SINGHAL	100	30	70	B	6	1	1	6
110	A60205221151	Mr TAPISH SHARMA	100	30	70	A	9	1	1	9
111	A60205221105	Mr KARANVEER SINGH RAJAWAT	100	30	70	A+	10	1	1	10
112	A60205221133	Mr PRATIK KUMAR JHA	100	30	70	B+	7	1	1	7
113	A60205221149	Mr DEVANSH DUBEY	100	30	70	B-	5	1	1	5
114	A60205221150	Ms OJASVI SHARMA	100	30	70	B+	7	1	1	7
115	A60205221152	Ms KHUSHI CHAUHAN	100	30	70	A-	8	1	1	8
116	A60205221160	Mr SHISHANK BHATNAGAR	100	30	70	B+	7	1	1	7
117	A60205221177	Mr AKHILESH SINGH TOMAR								

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118	A60205221181	Mr RITHIK NAIR	100	30	70	B+	7	1	1	7
119	A60205221183	Mr PRANSHU SHARMA	100	30	70	B+	7	1	1	7
120	A60205221214	Ms PRIYA KUMARI YADAV	100	30	70	B-	5	1	1	5
121	A60205221156	Mr RAJ SINGH RAJAWAT	100	30	70	B	6	1	1	6
122	A60205221167	Mr AASHI GUPTA	100	30	70	B+	7	1	1	7
123	A60205221173	Ms VAISHNAVI	100	30	70	B+	7	1	1	7
124	A60205221190	Mr ROHIT KUMAR PANDEY	100	30	70	B+	7	1	1	7
125	A60205221205	Ms AARUSHI SABOO	100	30	70	B+	7	1	1	7
126	A60205221121	Mr JYOTIRADITYA KUMAR SHRIVASTAVA	100	30	70	B-	5	1	1	5
127	A60205221124	Mr ARYAN VYAS	100	30	70	A-	8	1	1	8
128	A60205221135	Mr HARSHVARDHAN SINGH TOMAR	100	30	70	B+	7	1	1	7
129	A60205221140	Ms RAJVINDER KAUR	100	30	70	A-	8	1	1	8
130	A60205221141	Mr HARENDRA PRATAP SINGH BHADORIYA	100	30	70	B	6	1	1	6
131	A60205221093	Mr RAHUL SINGH DHAKAD	100	30	70	B+	7	1	1	7
132	A60205221103	Ms SUCHI JAIN	100	30	70	A-	8	1	1	8

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133	A60205221113	Ms ANAMIKA BAJPAI	100	30	70	A	9	1	1	9
134	A60205221128	Mr YASH PATHAK	100	30	70	B+	7	1	1	7
135	A60205221138	Ms KHUSHBOO JAIN	100	30	70	A-	8	1	1	8
136	A60205221163	Mr ABHISHEK RAJPUT	100	30	70	A-	8	1	1	8
137	A60205221174	Mr RITESH DWIVEDI	100	30	70	B-	5	1	1	5
138	A60205221176	Mr ABHAY SINGH BHADAURIA	100	30	70	B+	7	1	1	7
139	A60205221180	Ms PRIYANSHI GUPTA	100	30	70	B+	7	1	1	7
140	A60205221215	Mr ROHIT JAIN	100	30	70	B+	7	1	1	7
141	A60205221142	Mr AKASH YADAV	100	30	70	A-	8	1	1	8
142	A60205221157	Mr ABHISHEK SHARMA	100	30	70	B+	7	1	1	7
143	A60205221168	Mr NAMVER ALI ZAIDI	100	30	70	B+	7	1	1	7
144	A60205221188	Mr UJJWAL SHRIVASTAVA	100	30	70	B-	5	1	1	5
145	A60205221197	Ms ANSHIKA DAS	100	30	70	A-	8	1	1	8
146	A60205221201	Ms ANUSHKA TRIPATHI	100	30	70	B	6	1	1	6
147	A60205221246	Mr SATYAM RAJAWAT	100	30	70	B+	7	1	1	7
148	A60205221247	Ms ANUSHKA TOMAR								

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149	A60205221251	Mr YASH RAGHUVANSHI	100	30	70	A-	8	1	1	8
150	A60205221256	Mr VIVEK PAL	100	30	70	B+	7	1	1	7
151	A60205221226	Mr ARIN SHARMA	100	30	70	A	9	1	1	9
152	A60205221228	Mr PRAHARSH RAJ SINGH	100	30	70	A-	8	1	1	8
153	A60205221262	Ms ANAMIKA RAJPUT	100	30	70	A	9	1	1	9
154	A60205221264	Mr ARNAV SHARMA	100	30	70	A-	8	1	1	8
155	A60205221272	Ms ROJA SHARMA	100	30	70	A	9	1	1	9
156	A60205221274	Mr ADITYA RATHORE	100	30	70	A	9	1	1	9
157	A60205221285	Ms SAKSHI UPADHYAY	100	30	70	A-	8	1	1	8
158	A60205221287	Ms RITI MEENA	100	30	70	A-	8	1	1	8
159	A60205221309	Mr DEEP MATHUR	100	30	70	A-	8	1	1	8
160	A60205221310	Mr MRADUL SINGH RAJAWAT	100	30	70	B-	5	1	1	5
161	A60205221153	Mr ARYAN KHAN	100	30	70	A	9	1	1	9
162	A60205221170	Mr VIKAS PATIDAR	100	30	70	A	9	1	1	9
163	A60205221172	Mr HARIOM PATEL	100	30	70	A+	10	1	1	10
164	A60205221184	Ms PRATHA KHARE								

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165	A60205221208	Ms MOULI TIWARI	100	30	70	A-	8	1	1	8
166	A60205221231	Ms SANSKRITI GUPTA	100	30	70	A	9	1	1	9
167	A60205221235	Ms HIMANSHI SHARMA	100	30	70	A	9	1	1	9
168	A60205221237	Ms GARIMA GUPTA	100	30	70	B	6	1	1	6
169	A60205221242	Mr DEVASHISH	100	30	70	A-	8	1	1	8
170	A60205221244	Mr ARJIT SHARMA	100	30	70	A+	10	1	1	10
171	A60205221207	Mr AKSHAT SHANDILYA	100	30	70	B+	7	1	1	7
172	A60205221218	Mr VIVEK YADAV	100	30	70	B	6	1	1	6
173	A60205221222	Ms KRATIKA JADON	100	30	70	A-	8	1	1	8
174	A60205221227	Ms SALONI OJHA	100	30	70	B	6	1	1	6
175	A60205221254	Mr ABHAY SINGH BHADAURIYA	100	30	70	A-	8	1	1	8
176	A60205221261	Ms PRIYANSHI GARG	100	30	70	A-	8	1	1	8
177	A60205221277	Mr JATIN SHRIVASTAVA	100	30	70	A	9	1	1	9
178	A60205221278	Ms DEERGHA TIWARI	100	30	70	B+	7	1	1	7
179	A60205221288	Mr VAIBHAV GARG	100	30	70	A+	10	1	1	10
180	A60205221293	Mr HAPPY BHASIN								

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181	A60205221158	Mr ABHISHEKH SINGH	100	30	70	A-	8	1	1	8
182	A60205221166	Mr PRABHANSHU AGASHE	100	30	70	A	9	1	1	9
183	A60205221169	Ms ARADHNA RAJORIYA	100	30	70	A	9	1	1	9
184	A60205221189	Mr YOGESH VERMA	100	30	70	A+	10	1	1	10
185	A60205221191	Mr SHREYASH DWIVEDI	100	30	70	B+	7	1	1	7
186	A60205221139	Mr RAVI SINGH TOMAR	100	30	70	B+	7	1	1	7
187	A60205221154	Mr PIYUSH SINGH	100	30	70	A	9	1	1	9
188	A60205221165	Ms AYUSHI AWASTHI	100	30	70	B+	7	1	1	7
189	A60205221171	Ms METTU NAVYA SHREE	100	30	70	A	9	1	1	9
190	A60205221178	Ms AELLI GUPTA	100	30	70	B-	5	1	1	5
191	A60205221216	Mr ADITYA PATERIYA	100	30	70	B+	7	1	1	7
192	A60205221220	Mr SHAILENDRA SINGH	100	30	70	A-	8	1	1	8
193	A60205221229	Ms ANANYA SINGH	100	30	70	A	9	1	1	9
194	A60205221232	Ms SAKSHI SHAHI	100	30	70	A-	8	1	1	8
195	A60205221234	Ms SHRUTI DIXIT	100	30	70	A-	8	1	1	8
196	A60205221236	Ms URVASHI SHARMA								

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197	A60205221241	Mr SANTOSH SINGH TOMAR	100	30	70	A-	8	1	1	8
198	A60205221265	Mr KAUSTUBH ADITYA SHARMA	100	30	70	A-	8	1	1	8
199	A60205221267	Mr AMIT RAI	100	30	70	A-	8	1	1	8
200	A60205221269	Mr SAHITYA SATYA	100	30	70	A	9	1	1	9
201	A60205221271	Mr HARSH SHARMA	100	30	70	A-	8	1	1	8
202	A60205221273	Ms ARPITA BHARGAVA	100	30	70	A	9	1	1	9
203	A60205221286	Mr DEVANSH TOMAR	100	30	70	A	9	1	1	9
204	A60205221308	Mr KARTIK NEDIYARA	100	30	70	A-	8	1	1	8
205	A60205221221	Ms DIVYANSHI BHADORIA	100	30	70	A	9	1	1	9
206	A60205221258	Ms VAISHALI PATERIYA	100	30	70	A-	8	1	1	8
207	A60205221259	Mr KARAN KUMAR CHAURASIA	100	30	70	B-	5	1	1	5
208	A60205221260	Ms MUSKAN MANGAL	100	30	70	A	9	1	1	9
209	A60205221289	Mr SHUBHAM DWIVEDI	100	30	70	A	9	1	1	9
210	A60205221295	Mr PRASHANT KUMAR	100	30	70	A	9	1	1	9
211	A60205221296	Mr YASH RAI	100	30	70	B+	7	1	1	7
212	A60205221299	Mr ABHISHEK SHARMA								

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213	A60205221305	Ms BHARTI SAHU	100	30	70	A-	8	1	1	8
214	A60205221185	Mr KOVURI PRAMOD SAI	100	30	70	A-	8	1	1	8
215	A60205221192	Mr VANSH AGGARWAL	100	30	70	A-	8	1	1	8
216	A60205221195	Mr ANURAG SINGH TOMAR	100	30	70	A	9	1	1	9
217	A60205221203	Mr HARSH MALVIYA	100	30	70	A-	8	1	1	8
218	A60205221210	Mr HARSH TIWARI	100	30	70	A+	10	1	1	10
219	A60205221224	Mr SHIVAM UPADHYAY	100	30	70	B-	5	1	1	5
220	A60205221225	Mr ADARSH KUSHWAH	100	30	70	A	9	1	1	9
221	A60205221239	Mr AAYUSH KUMAR	100	30	70	A-	8	1	1	8
222	A60205221249	Mr PIYUSH SHUKLA	100	30	70	A+	10	1	1	10
223	A60205221252	Mr RUPESH SINGH	100	30	70	A-	8	1	1	8
224	A60205221211	Mr DEVASHISH PANDEY	100	30	70	A-	8	1	1	8
225	A60205221243	Ms SHRUTI SINGH KUSHWAH	100	30	70	A+	10	1	1	10
226	A60205221253	Mr NILAY KUMAR SINGH	100	30	70	A	9	1	1	9
227	A60205221282	Mr HEMRAJ PATHAK	100	30	70	A	9	1	1	9
228	A60205221312	Mr GAURAV VYAS								

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229	A60205221257	Ms ROLI TIWARI	100	30	70	A-	8	1	1	8
230	A60205221290	Mr SUJAL MAURYA	100	30	70	A	9	1	1	9
231	A60205221297	Mr ANUBHAV SHARMA	100	30	70	A-	8	1	1	8
232	A60205221298	Mr VIBHOR AGRAWAL	100	30	70	A	9	1	1	9
233	A60205221300	Mr VAIBHAV SINGH	100	30	70	A-	8	1	1	8
234	A60205221294	Ms RIYA SINGH	100	30	70	A	9	1	1	9
235	A60205221306	Mr ANKIT KAURAV	100	30	70	A-	8	1	1	8
236	A60205221303	Mr AYUSH JOON	100	30	70	B	6	1	1	6
237	A60205221266	Mr AMIT SINGH	100	30	70	A-	8	1	1	8
238	A60205221268	Ms SHRAVANI VAIDYA	100	30	70	A-	8	1	1	8
239	A60205221270	Ms YASHIKA UPADHYAY	100	30	70	A	9	1	1	9
240	A60205221281	Mr SUJAL SHAKYA	100	30	70	A	9	1	1	9
241	A60205221263	Mr DEVESH SHAH	100	30	70	A-	8	1	1	8
242	A60205221275	Mr ABHAY SINGH CHANDEL	100	30	70	A+	10	1	1	10
243	A60205221291	Mr RISHEEK SHUKLA	100	30	70	A-	8	1	1	8
244	A60205221301	Ms ANGEL RAJPUT								

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245	A60205221311	Mr AJAY SINGH GANGWAR	100	30	70	A+	10	1	1	10
							1804			

Average Grade Point = 1804/245 (Total Grade point/Total no of students) = 7.36
No of students getting greater than average (7.36) marks = 119 students = 48.5%

Total No. of Students	**=**	**245**
Level 1	<50% - Average marks	**48.5%**
Attainment Level		**Level 1**

Note: Attainment Level

Level 1	<50% - Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : DATABASE MANAGEMENT SYSTEMS LAB
Course Code : CSE324, Crédits : 01, Session: 2022-23(Odd Sem.), Class : B.Tech. 2nd Year
Faculty Name : Dr. Deepak Motwani

A. **Introduction**: To write and execute SQL statements, understand design of backend applications

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

CSE324.1. Understand the basic concepts of SQL and its queries.
CSE324.2. Apply the theoretical concepts to execute SQL statements.
CSE324.3. Analyze the concept of SQL queries by practically implementing them.
CSE324.4. Demonstrate the use of insertion, deletion and updation operation on Databases.
CSE324.5. Design the Database application for the real life projects.

C. Programme Outcomes:

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for

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sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[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

[PO.12]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

D. Programme Specific Outcomes:

PSO1: Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2: Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3: Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term Viva	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a studentto be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	A	5%

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End Semester Examination	End Semester Practical Examination	EE	70%
Total			**100%**

F. Syllabus

1. Using create command design three specific table and the table structure is given below. Table name- Book

ISBN	TITLE	PUB_YEAR	UNIT_PRICE	AUTHOR_NAME	PUB_NAME
1001	Oracle	2004	399	Arora	phi
1002	Dbms	2004	400	Basu	technical
2001	Dos	2003	250	Sinha	nirali
2002	Adbms	2004	450	Basu	technical
2003	Unix	2000	300	Kapoor	scitech

Table name- Author

AUTHOR_NAME	COUNTRY
Arora	U.S.A.
Kapoor	Canada
Basu	India
Sinha	India

Table name- Publisher

PUB_NAME	PUB_ADD1
Phi	Delhi
Technical	Pune mainmarket
Nirali	Mumbai
Scitech	Chennai

2. Write the SQL query to find the name of all publisher from Book relation. (2 Hours)
3. Write the SQL query to display the name of all publisher using distinct clause. (2 Hours)
4. Write the SQL query to find the names of author from the author table where the first two characters of names are ‘ba’. (2 Hours)
5. Write the SQL query to display title of books published in year 2004. (2 Hours)
6. Write the SQL query to display title of books having price between 300 to 400. (1 Hour)
7. Write the SQL query to display title of books having price between 300 to 400 using operators. (1 Hour)
8. Write the SQL query to display title of books with author_name and country published in year 2004. (1 Hour)
9. Write the SQL query to display all title and (unit_price*10) as an attribute from book table using arithmetic expression. (01 Hour)
10. Write the SQL query to add the new column in all three tables. (1 Hour)
11. Study the concept of Views and their utility in DBMS, write the SQL query to design a view. (1 Hour)
12. Write the SQL query to make the attribute ISBN as a primary key in Book relation. (1 Hour)

13. Write the SQL query to display the all the titles of Books with price and year in descending order. (1 Hour)
14. Write the SQL query to study the use of Delete and Drop command in DBMS. (1 Hour)
15. Study the concept of Triggers, cursors and stored procedures in DBMS. (1 Hour)

G. Examination Scheme:

IA			EE			
A	**PR**	**Practical Based Test**	**Major Experiment**	**Minor Experiment**	**LR**	**Viva**
5	10	15	35	15	10	10

Note: IA –Internal Assessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V –Viva.

H. Suggested Text/Reference Books:

I. Lab Plan

Practical	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	DDL (Data Definition Language) statements	Practical	CSE324.1.	Mid Term Viva, Quiz & End Sem Practical Exam
2	DML (Data Manipulation Language) statements:	Practical	CSE324.1.	Mid Term Viva, Quiz & End Sem Practical Exam
3	To practice basic SQL DDL Commands such as CREATE, DROP, etc.	Practical	CSE324.1.	Mid Term Viva, Quiz & End Sem Practical Exam
4	To practice basic SQL DML Commands such as INSERT, DELETE, etc.	Practical	CSE324.2	Mid Term Viva, Quiz & End Sem Practical Exam
5	To practice basic SQL DCL Commands such as COMMIT, ROLLBACK	Practical	CSE324.2	Mid Term Viva, Quiz & End Sem Practical Exam
6	Writing Queries using GROUP BY, HAVING and ORDER BY clauses.	Practical	CSE324.3	Mid Term Viva, Quiz & End Sem Practical Exam
7	Writing Nested Queries, using Set operations.	Practical	CSE324.3	Quiz & End Sem Practical Exam
8	Writing Queries using functions.	Practical	CSE324.4	Quiz & End Sem Practical Exam
9	Writing Queries on views.	Practical	CSE324.4	Quiz & End Sem Practical Exam
10	PL/ SQL PROGRAMS	Practical	CSE324.5	Quiz & End Sem Practical Exam
11	Writing PL/SQL CURSOR	Practical	CSE324.5	Quiz & End Sem Practical Exam

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12	Writing PL/SQL triggers	Practical	CSE324.5	Quiz & End Sem Practical Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE324.1	Understand the basic concepts of SQL and its queries.													1	3	
CSE324.2	Apply the theoretical concepts to execute SQL statements.	2	1	2	**3**	1										
CSE324.3	Analyze the concept of SQL queries by practically implementing them.	1	2	2	1	2										
CSE324.5	Demonstrate the use of insertion, deletion and updation operation on Databases.	2	3	2	1	2										
CSE324.5	Design the Database application for the real life projects.	1	2	3	1	3										

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ATTAINMENT

ESE CSE324 DATABASE MANAGEMENT SYSTEMS LAB

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S. No.	Enrollment.No.	Student's Name	CSE324 DATABASE MANAGEMENT SYSTEMS LAB Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U15G15
1	A60205222012	Mr NITIN JHA	100	30	70	A-	8	1	1	8
2	A60205222011	Ms DIKSHA BATHAM	100	30	70	A+	10	1	1	10
3	A60205222009	Ms AAYUSHI ARORA	100	30	70	B+	7	1	1	7
4	A60205222004	Mr KAUSHAL SHARMA	100	30	70	A	9	1	1	9
5	A60205221048	Mr DHRUV SINGH RAWAT	100	30	70	A	9	1	1	9
6	A60205222035	Mr DIVYANSH TRIPATHI	100	30	70	A-	8	1	1	8
7	A60205221044	Mr RAJEEV SHARMA	100	30	70	B+	7	1	1	7
8	A60205222015	Ms MOHINI SHARMA	100	30	70	A+	10	1	1	10
9	A60205222021	Mr PRAKHAR TIWARI	100	30	70	A-	8	1	1	8
10	A60205222020	Mr MOHIT YADAV	100	30	70	A	9	1	1	9
11	A60205222030	Mr ANSHUL CHANDRA	100	30	70	A	9	1	1	9
12	A60205222005	Mr ENOCH NEERIKSHAN	100	30	70	A-	8	1	1	8
13	A60205222001	Mr SIDDHARTH JAIN	100	30	70	A	9	1	1	9
14	A60205222037	Ms AKANKSHA RAJPUT	100	30	70	A-	8	1	1	8
15	A60205222002	Ms RIYA KUSHWAH	100	30	70	A+	10	1	1	10
16	A60205222036	Mr ADITYA SINGH	100	30	70	A-	8	1	1	8

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		CHAUHAN								
17	A60205222046	Mr ASHISH SINGH	100	30	70	A-	8	1	1	8
18	A60205222022	Ms ANUSHKA SHARMA	100	30	70	A+	10	1	1	10
19	A60205222033	Mr SHIVAM CHAURASIYA	100	30	70	B+	7	1	1	7
20	A60205222031	Mr SHIVAM SHRIVASTAVA	100	30	70	A	9	1	1	9
21	A60205222016	Mr SHAILENDRA MOURYA	100	30	70	A	9	1	1	9
22	A60205222068	Mr VIVEK SINGH BHADORIA	100	30	70	A-	8	1	1	8
23	A60205222006	Mr PRAVEEN KUMAR RAWAT	100	30	70	A	9	1	1	9
24	A60205222041	Mr BHUPENDRA SINGH RAJPUT	100	30	70	A	9	1	1	9
25	A60205222052	Ms APOORVA PATHAK	100	30	70	A	9	1	1	9
26	A60205222045	Mr ABHISHEK RAWAT	100	30	70	A-	8	1	1	8
27	A60205222049	Ms AVISHI SHRIVASTAVA	100	30	70	A	9	1	1	9
28	A60205222032	Mr DIVYANSHU PAL	100	30	70	B+	7	1	1	7
29	A60205222027	Ms ANUSHKA SHARMA	100	30	70	A+	10	1	1	10
30	A60205222073	Ms TANISHA RATHORE	100	30	70	A	9	1	1	9
31	A60205222017	Mr GOURAV JAT	100	30	70	A-	8	1	1	8
32	A60205222050	Mr ARYAN SAHU	100	30	70	A-	8	1	1	8
33	A60205222054	Mr KULDEEP	100	30	70	A	9	1	1	9

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		SHARMA								
34	A60205222047	Mr SIDHARTH GUPTA	100	30	70	B+	7	1	1	7
35	A60205222059	Mr RAHUL SHARMA	100	30	70	A-	8	1	1	8
36	A60205222063	Mr PRANAV PRITAM	100	30	70	B	6	1	1	6
37	A60205222028	Mr PIYUSH TOMAR	100	30	70	DE	0	1	0	0
38	A60205222097	Ms PRIYA GOYAL	100	30	70	A-	8	1	1	8
39	A60205222026	Mr SANSKAR JAIN	100	30	70	A-	8	1	1	8
40	A60205222057	Mr ABHISHEK SINGH TOMAR	100	30	70	A-	8	1	1	8
41	A60205222072	Mr ROHIT SHARMA	100	30	70	A	9	1	1	9
42	A60205222051	Ms TANYA RAJ	100	30	70	A-	8	1	1	8
43	A60205222061	Mr ADITYA SIKARWAR	100	30	70	B+	7	1	1	7
44	A60205222095	Mr NEELESH RATHORE	100	30	70	B+	7	1	1	7
45	A60205222040	Mr SOMESH BARMAN	100	30	70	B	6	1	1	6
46	A60205222099	Mr RISHABH SINGH SIKARWAR	100	30	70	A-	8	1	1	8
47	A60205222029	Mr SARANSH JAIN	100	30	70	B+	7	1	1	7
48	A60205222062	Mr ANUPAM SHARMA	100	30	70	A-	8	1	1	8
49	A60205222074	Mr ADITYA PRATAP SINGH	100	30	70	A-	8	1	1	8
50	A60205222053	Mr AKASH SINGH	100	30	70	A	9	1	1	9
51	A60205222093	Mr NISHANT YADAV	100	30	70	A-	8	1	1	8
52	A60205222114	Mr R	100	30	70	A-	8	1	1	8

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		KARTHIKEYAN								
53	A60205222042	Mr ABHISHEK SHARMA	100	30	70	A-	8	1	1	8
54	A60205222100	Ms SURABHI RATHORE	100	30	70	A-	8	1	1	8
55	A60205222034	Mr SAHIL UPADHYAY	100	30	70	A-	8	1	1	8
56	A60205222067	Mr ANURAG SHARMA	100	30	70	A-	8	1	1	8
57	A60205222078	Mr VIVEK SINGH TOMAR	100	30	70	B+	7	1	1	7
58	A60205222069	Mr NARENDRA SINGH BHADOURIYA	100	30	70	B+	7	1	1	7
59	A60205222094	Mr RUDRANSH SHARMA	100	30	70	B	6	1	1	6
60	A60205222127	Mr RUDRA PRATAP SINGH BHADORIYA	100	30	70	A	9	1	1	9
61	A60205222044	Mr AYUSH GIRI	100	30	70	A	9	1	1	9
62	A60205222106	Mr SUYASH GOYAL	100	30	70	A-	8	1	1	8
63	A60205222043	Mr AVIRAL BHADOURIA	100	30	70	A	9	1	1	9
64	A60205222075	Mr KRISHNA RAJ SINGH CHAUHAN	100	30	70	B+	7	1	1	7
65	A60205222086	Mr SHIVAM RATHORE	100	30	70	A	9	1	1	9
66	A60205222077	Mr DHRUV UPADHYAYA	100	30	70	B	6	1	1	6
67	A60205222116	Mr KRISHNA PRAJAPATI	100	30	70	A-	8	1	1	8
68	A60205222133	Mr MAYANK GOUR	100	30	70	A	9	1	1	9
69	A60205222056	Mr DEV SHIVHARE	100	30	70	A-	8	1	1	8
70	A60205222110	Ms ANUSHA	100	30	70	B	6	1	1	6

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		SHARMA								
71	A60205222055	Ms ANANYA LIKHAR	100	30	70	A	9	1	1	9
72	A60205222083	Ms RUCHI SHARMA	100	30	70	A	9	1	1	9
73	A60205222105	Mr ANSHUL PANDEY	100	30	70	B+	7	1	1	7
74	A60205222085	Ms KOMOLIKA AGARWAL	100	30	70	A	9	1	1	9
75	A60205222128	Ms DISHA SARASWAT	100	30	70	A	9	1	1	9
76	A60205222136	Ms SWASTI AGARWAL	100	30	70	A	9	1	1	9
77	A60205222058	Mr GOPAL UPADHYAY	100	30	70	A	9	1	1	9
78	A60205222112	Ms NANDINI BISWAS	100	30	70	A	9	1	1	9
79	A60205222060	Mr HARI OM RAI	100	30	70	B+	7	1	1	7
80	A60205222101	Mr SAURAV SONI	100	30	70	B	6	1	1	6
81	A60205222113	Mr ADITYA PARMAR	100	30	70	B	6	1	1	6
82	A60205222087	Mr YUVRAJ SINGH CHAUDHARY	100	30	70	A-	8	1	1	8
83	A60205222130	Mr ADITYA JAIN	100	30	70	A-	8	1	1	8
84	A60205222142	Mr RUMMAN PARVEZ	100	30	70	A	9	1	1	9
85	A60205222076	Ms VAISHALI JHA	100	30	70	A	9	1	1	9
86	A60205222119	Mr ANSH LITAURIYA	100	30	70	B+	7	1	1	7
87	A60205222065	Mr ARJUN PRATAP SINGH TOMAR	100	30	70	B	6	1	1	6
88	A60205222108	Mr ROHIT	100	30	70	A-	8	1	1	8

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		SHARMA								
89	A60205222125	Mr AVIJIT SHARMA	100	30	70	A-	8	1	1	8
90	A60205222124	Mr JEETU SINGH	100	30	70	A-	8	1	1	8
91	A60205222135	Mr ARVIND SINGH TOMAR	100	30	70	A-	8	1	1	8
92	A60205222159	Mr VAIBHAV SINGH CHANDEL	100	30	70	B	6	1	1	6
93	A60205222082	Ms SNEHA TIWARI	100	30	70	A	9	1	1	9
94	A60205222120	Mr ARYAN KUSHWAH	100	30	70	A-	8	1	1	8
95	A60205222081	Mr RISHAB SINGH	100	30	70	A-	8	1	1	8
96	A60205222117	Mr SUNNY SHRIVASTAVA	100	30	70	B+	7	1	1	7
97	A60205222138	Mr VIKRAM DEV BHADORIYA	100	30	70	B+	7	1	1	7
98	A60205222126	Mr KUSHANK BANSAL	100	30	70	A-	8	1	1	8
99	A60205222140	Mr HIMANSH SINGH KUSHWAH	100	30	70	A-	8	1	1	8
100	A60205222175	Ms PRITIKA	100	30	70	A	9	1	1	9
101	A60205222088	Mr HIMANSHU PARMAR	100	30	70	B	6	1	1	6
102	A60205222122	Mr YUVRAJ SINGH PALI	100	30	70	B+	7	1	1	7
103	A60205222091	Mr DHEERENDRA SINGH CHAUHAN	100	30	70	B	6	1	1	6
104	A60205222118	Mr DHEERAJ KUNDWANI	100	30	70	A	9	1	1	9
105	A60205222147	Ms ANJALI CHAUHAN	100	30	70	A-	8	1	1	8

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106	A60205222145	Mr HIMANSHU KUMAR	100	30	70	A-	8	1	1	8
107	A60205222177	Ms ANJALI SHARMA	100	30	70	A	9	1	1	9
108	A60205222186	Mr SAGAR MEENA	100	30	70	B-	5	1	1	5
109	A60205222090	Mr AJAY RATHOR	100	30	70	B+	7	1	1	7
110	A60205222129	Mr YOGESH SHRIVASTAVA	100	30	70	B	6	1	1	6
111	A60205222098	Mr ABHISHEK SINGH TOMAR	100	30	70	B	6	1	1	6
112	A60205222143	Mr AYUSH SINGH BHADORIA	100	30	70	A-	8	1	1	8
113	A60205222151	Mr HITESH SINGH CHAUHAN	100	30	70	A-	8	1	1	8
114	A60205222148	Mr MANISH BANSAL	100	30	70	A	9	1	1	9
115	A60205222219	Mr AMAN SINGH TOMAR	100	30	70	B+	7	1	1	7
116	A60205222218	Mr KANISHK BAJPAI	100	30	70	A-	8	1	1	8
117	A60205222109	Ms GUNGUN TRIPATHI	100	30	70	A	9	1	1	9
118	A60205222137	Mr MANTHAN SHEKHAWAT	100	30	70	B+	7	1	1	7
119	A60205222103	Ms SONALI DEB	100	30	70	A-	8	1	1	8
120	A60205222153	Ms ANANYA JAIN	100	30	70	B	6	1	1	6
121	A60205222164	Mr SAKIB KHAN	100	30	70	B+	7	1	1	7
122	A60205222150	Ms SHIVANI GUPTA	100	30	70	A	9	1	1	9
123	A60205222223	Ms KRATIKA RAJAWAT	100	30	70	B	6	1	1	6

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124	A60205222224	Mr ADIT RAJPUT	100	30	70	A	9	1	1	9
125	A60205222123	Mr ISHANT RATHORE	100	30	70	B	6	1	1	6
126	A60205222139	Ms BEEMIREDDY KEERTHI PRIYA	100	30	70	A-	8	1	1	8
127	A60205222107	Mr VIKESH JHA	100	30	70	A-	8	1	1	8
128	A60205222163	Mr PRATEEK JAISWAL	100	30	70	B-	5	1	1	5
129	A60205222171	Ms PRAGATI BHADORIA	100	30	70	B	6	1	1	6
130	A60205222165	Ms SHITAKSHI SINGH SIKARWAR	100	30	70	B-	5	1	1	5
131	A60205222229	Mr MANVENDRA SIKARWAR	100	30	70	A-	8	1	1	8
132	A60205222227	Ms ARPITA DHAKAD	100	30	70	A-	8	1	1	8
133	A60205222132	Mr MOHIT SINGH	100	30	70	A-	8	1	1	8
134	A60205222152	Ms PALAK GUPTA	100	30	70	B	6	1	1	6
135	A60205222111	Ms SOMYA SHARMA	100	30	70	A	9	1	1	9
136	A60205222176	Mr MAHENDRA SINGH	100	30	70	A-	8	1	1	8
137	A60205222196	Mr LAVYANSH JAIN	100	30	70	B	6	1	1	6
138	A60205222167	Mr RAMAN SHARMA	100	30	70	A-	8	1	1	8
139	A60205222230	Mr AVISHEK SINGH	100	30	70	A-	8	1	1	8
140	A60205222236	Mr KAUSHAL SINGH RANA	100	30	70	A-	8	1	1	8
141	A60205222146	Mr AMAN PANDEY	100	30	70	A-	8	1	1	8

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142	A60205222154	Ms SHREEJI TIWARI	100	30	70	A+	10	1	1	10
143	A60205222121	Ms ARADHYA YADAV	100	30	70	A-	8	1	1	8
144	A60205222181	Mr AYUSH MISHRA	100	30	70	B+	7	1	1	7
145	A60205222201	Ms SHRADDHA KUSHWAH	100	30	70	A	9	1	1	9
146	A60205222184	Mr UDAY PRATAP SINGH SIKARWAR	100	30	70	B-	5	1	1	5
147	A60205222235	Mr ASTIK GUPTA	100	30	70	A	9	1	1	9
148	A60205222240	Ms RITIKA NAINANI	100	30	70	A-	8	1	1	8
149	A60205222149	Ms KIRTI PATHAK	100	30	70	A-	8	1	1	8
150	A60205222156	Mr NEETESH SHARMA	100	30	70	B	6	1	1	6
151	A60205222134	Mr NIKIT PATHAK	100	30	70	A	9	1	1	9
152	A60205222182	Mr GUNVEER SINGH SALUJA	100	30	70	B	6	1	1	6
153	A60205222207	Mr ALOK DIXIT	100	30	70	B-	5	1	1	5
154	A60205222197	Mr SACHIN SHRIVAS	100	30	70	A	9	1	1	9
155	A60205222242	Ms PRATIBHA AGRAWAL	100	30	70	A	9	1	1	9
156	A60205222266	Mr SHUBHAM DHAKAD	100	30	70	A	9	1	1	9
157	A60205222162	Ms UNNATI SARASWAT	100	30	70	B	6	1	1	6
158	A60205222169	Mr SAKSHAM JAIN	100	30	70	A	9	1	1	9
159	A60205222155	Mr VIKASH YADAV	100	30	70	B-	5	1	1	5
160	A60205222192	Mr MANISH RAJ	100	30	70	B-	5	1	1	5

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161	A60205222211	Ms ASTHA GUPTA	100	30	70	B	6	1	1	6
162	A60205222200	Mr MOHAMMAD ARSHAAN	100	30	70	A	9	1	1	9
163	A60205222243	Mr MADHUP SHARMA	100	30	70	A	9	1	1	9
164	A60205222269	Mr AYUSH RAJ SINGH	100	30	70	B+	7	1	1	7
165	A60205222179	Ms SNEHA PANDEY	100	30	70	A-	8	1	1	8
166	A60205222170	Mr GAURAV KUMAR	100	30	70	A-	8	1	1	8
167	A60205222168	Mr KRISHNA KUSHWAH	100	30	70	B+	7	1	1	7
168	A60205222202	Ms ATIRA YAMEEN	100	30	70	B	6	1	1	6
169	A60205222213	Mr DEV SHARMA	100	30	70	A-	8	1	1	8
170	A60205222206	Mr PIYUSH RANJAN	100	30	70	B+	7	1	1	7
171	A60205222267	Ms ANIKA MANJHI	100	30	70	A-	8	1	1	8
172	A60205222283	Mr SOURABH SONI	100	30	70	B+	7	1	1	7
173	A60205222180	Mr PRANJAL RAJ	100	30	70	A	9	1	1	9
174	A60205222193	Mr DAMODAR YADAV	100	30	70	A-	8	1	1	8
175	A60205222178	Mr ARSHAD RAZA	100	30	70	B	6	1	1	6
176	A60205222225	Mr VEDANSH SHRIVASTAVA	100	30	70	B-	5	1	1	5
177	A60205222221	Mr LAKSHYA PENDHARKAR	100	30	70	B-	5	1	1	5
178	A60205222210	Mr VIVEK KUMAR MUKESH SHRIVAS	100	30	70	B-	5	1	1	5

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179	A60205222268	Mr SURJEET KARAN	100	30	70	B-	5	1	1	5
180	A60205222284	Mr KARTIKEY SINGH BHADAURIYA	100	30	70	A-	8	1	1	8
181	A60205222183	Mr ABHISHEK TIWARI	100	30	70	B	6	1	1	6
182	A60205222199	Ms NISHTHA RAWAT	100	30	70	A	9	1	1	9
183	A60205222188	Mr AMAN KUMAR RAJAWAT	100	30	70	B-	5	1	1	5
184	A60205222232	Mr VAIBHAV PRATAP SINGH KUSHWAH	100	30	70	C+	4	1	1	4
185	A60205222252	Mr SUMIT PATHWAR	100	30	70	B-	5	1	1	5
186	A60205222216	Mr DIVYAKANT MISHRA	100	30	70	B-	5	1	1	5
187	A60205222282	Mr PIYUSH SEN	100	30	70	B	6	1	1	6
188	A60205222310	Ms RIYA SINGH	100	30	70	A	9	1	1	9
189	A60205222185	Mr MOHAMMAD KAISH KHAN	100	30	70	B+	7	1	1	7
190	A60205222204	Ms ANUSHKA SAXENA	100	30	70	B	6	1	1	6
191	A60205222191	Mr PRASHANT SINGH TOMAR	100	30	70	B+	7	1	1	7
192	A60205222233	Ms SHAILY GUPTA	100	30	70	A	9	1	1	9
193	A60205222254	Mr AMIT SINGH TOMAR	100	30	70	A-	8	1	1	8
194	A60205222222	Mr ABHAY GOUD	100	30	70	B+	7	1	1	7
195	A60205222291	Mr ANURAG SHARMA	100	30	70	B-	5	1	1	5
196	A60205222320	Mr NIHAL SINGH	100	30	70	A-	8	1	1	8

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		CHAUHAN								
197	A60205222189	Mr YASH DUBEY	100	30	70	B-	5	1	1	5
198	A60205222226	Mr NAMAN GUPTA	100	30	70	A-	8	1	1	8
199	A60205222194	Ms YASHI GUPTA	100	30	70	A	9	1	1	9
200	A60205222239	Ms SONALI SENGAR	100	30	70	B	6	1	1	6
201	A60205222261	Mr ABHISHEK SHARMA	100	30	70	B-	5	1	1	5
202	A60205222237	Mr ANUJ SINGH BHADAURIYA	100	30	70	A-	8	1	1	8
203	A60205222294	Ms SHANYA CHAUHAN	100	30	70	B+	7	1	1	7
204	A60205222337	Mr SIDDHANT SHARMA	100	30	70	B+	7	1	1	7
205	A60205222190	Mr KANISHK DEORA	100	30	70	B-	5	1	1	5
206	A60205222231	Mr MANAV SHRIVASTAVA	100	30	70	B	6	1	1	6
207	A60205222205	Ms PARI SINGH	100	30	70	A	9	1	1	9
208	A60205222244	Mr RAVINDRA RAJAK	100	30	70	A-	8	1	1	8
209	A60205222273	Mr MAYANK SONI	100	30	70	B	6	1	1	6
210	A60205222251	Mr RAHUL RAJPOOT	100	30	70	C+	4	1	1	4
211	A60205222309	Mr DEVANSH KAKWANI	100	30	70	B	6	1	1	6
212	A60205222353	Mr MANN SHARMA	100	30	70	A-	8	1	1	8
213	A60205222203	Mr ANAS KHAN	100	30	70	A	9	1	1	9
214	A60205222234	Ms ANUSHA UPADHYAY	100	30	70	B-	5	1	1	5
215	A60205222228	Mr SAMBHAV	100	30	70	B+	7	1	1	7

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		AGARWAL								
216	A60205222265	Ms NIHARIKA MISHRA	100	30	70	A	9	1	1	9
217	A60205222275	Mr ANUJ RAJPUT	100	30	70	B-	5	1	1	5
218	A60205222260	Mr AJAY PRATAP TOMAR	100	30	70	B-	5	1	1	5
219	A60205222311	Mr ADITYA SHARMA	100	30	70	A	9	1	1	9
220	A60205222360	Mr RISHABH LAVANIA	100	30	70	A-	8	1	1	8
221	A60205222215	Mr ARYAN SINGH BAIS	100	30	70	B+	7	1	1	7
222	A60205222247	Ms PALLAVI MISHRA	100	30	70	B+	7	1	1	7
223	A60205222246	Mr VIVEK TYAGI	100	30	70	B-	5	1	1	5
224	A60205222278	Mr NITIN RAJPUT	100	30	70	A	9	1	1	9
225	A60205222296	Ms IRAM FATIMA	100	30	70	B+	7	1	1	7
226	A60205222274	Mr VIVEK DHAKAR	100	30	70	B-	5	1	1	5
227	A60205222315	Mr VAIBHAV PURWAR	100	30	70	A-	8	1	1	8
228	A60205222290	Mr AMIT RAJPUT	100	30	70	A-	8	1	1	8
229	A60205222217	Mr SHIVKUMAR SINGH RAJAWAT	100	30	70	A-	8	1	1	8
230	A60205222253	Mr SHAURYA GUPTA	100	30	70	B	6	1	1	6
231	A60205222256	Mr AKASH JADON	100	30	70	B	6	1	1	6
232	A60205222295	Mr PUSHPENDRA KUMAR	100	30	70	A-	8	1	1	8

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		SHARMA								
233	A60205222302	Mr NAITIK SINGH	100	30	70	B+	7	1	1	7
234	A60205222276	Mr ARJUN CHHAWARI	100	30	70	C+	4	1	1	4
235	A60205222322	Ms GRACY SINGH TOMAR	100	30	70	A-	8	1	1	8
236	A60205222308	Mr ANIRUDHA SINGH TOMAR	100	30	70	B+	7	1	1	7
237	A60205222238	Mr ZUBAIR	100	30	70	B-	5	1	1	5
238	A60205222255	Mr PRADEEP SINGH GURJAR	100	30	70	B-	5	1	1	5
239	A60205222258	Mr HARDIK CHANDRA	100	30	70	B-	5	1	1	5
240	A60205222314	Ms DEEPIKA	100	30	70	B+	7	1	1	7
241	A60205222304	Mr AMAN SINGH TOMAR	100	30	70	B+	7	1	1	7
242	A60205222280	Mr SHIVAM KUMAR SINGH	100	30	70	B-	5	1	1	5
243	A60205222338	Mr PRASHANT UPADHYAY	100	30	70	A-	8	1	1	8
244	A60205222321	Ms BHADORIA SWASTIKA JITENDRA SINGH	100	30	70	B+	7	1	1	7
245	A60205222245	Mr PRASHANT KUMAR	100	30	70	B-	5	1	1	5
246	A60205222272	Mr ESHAN SHARMA	100	30	70	A-	8	1	1	8
247	A60205222263	Mr VINAYAK CHATURVEDI	100	30	70	B+	7	1	1	7
248	A60205222335	Mr ANUJ SHARMA	100	30	70	B+	7	1	1	7
249	A60205222328	Mr KESHRI SINGH RAJAWAT	100	30	70	A	9	1	1	9
250	A60205222297	Mr HARSH VARDHAN SINGH	100	30	70	B-	5	1	1	5

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		BHADORIA								
251	A60205222372	Ms PRIYA KAPOOR	100	30	70	B+	7	1	1	7
252	A60205222358	Ms DEEPTI EKKA	100	30	70	A	9	1	1	9
253	A60205222250	Mr MRATYUNJAY SHARMA	100	30	70	B-	5	1	1	5
254	A60205222305	Mr NITANT RAJ TIWARI	100	30	70	B	6	1	1	6
255	A60205222271	Ms LEKHNI KUMBHARE	100	30	70	A-	8	1	1	8
256	A60205222365	Mr NISHANT SINGH	100	30	70	A	9	1	1	9
257	A60205222330	Mr GOVIND KUMAR JHA	100	30	70	B+	7	1	1	7
258	A60205222299	Ms DISHA AGRAWAL	100	30	70	B	6	1	1	6
259	A60205222285	Ms KANAN GUPTA	100	30	70	A-	8	1	1	8
260	A60205222307	Mr KAUSHAL SHARMA	100	30	70	B+	7	1	1	7
261	A60205222257	Ms BHOOMI JAIN	100	30	70	B	6	1	1	6
262	A60205222301	Mr RUDRESH BHARDWAJ	100	30	70	B+	7	1	1	7
263	A60205222286	Mr VIVEK SHARMA	100	30	70	B+	7	1	1	7
264	A60205222324	Mr NAVEEN KUMAR	100	30	70	A+	10	1	1	10
265	A60205222332	Ms MANYA GUPTA	100	30	70	A-	8	1	1	8
266	A60205222303	Mr RISHI TIWARI	100	30	70	B-	5	1	1	5
267	A60205222306	Ms SNEHA MASTAGAR	100	30	70	B-	5	1	1	5
268	A60205222326	Mr ABHISHEK TRIPATHI	100	30	70	B	6	1	1	6

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269	A60205222262	Mr ADITYA SINGH BHADORIYA	100	30	70	B+	7	1	1	7
270	A60205222318	Mr ANMOL BOHARE	100	30	70	B	6	1	1	6
271	A60205222323	Mr ADITYA SHARMA	100	30	70	A-	8	1	1	8
272	A60205222329	Mr SUMIT SHARMA	100	30	70	A	9	1	1	9
273	A60205222366	Mr SOMESHWAR BAREWAR	100	30	70	A-	8	1	1	8
274	A60205222331	Mr ABHIJEET KUMAR PANDEY	100	30	70	B+	7	1	1	7
275	A60205222333	Mr JATIN JAIN	100	30	70	A-	8	1	1	8
276	A60205222346	Mr DEVANSH DIWEDI	100	30	70	B	6	1	1	6
277	A60205222264	Mr MAKHAN CHAUHAN	100	30	70	B-	5	1	1	5
278	A60205222344	Mr PRASHANT MISHRA	100	30	70	A	9	1	1	9
279	A60205222341	Mr VISHRUT SINGH DHAKRE	100	30	70	A	9	1	1	9
280	A60205222347	Mr RISHAV GUPTA	100	30	70	B+	7	1	1	7
281	A60205222368	Ms ANAM KHAN	100	30	70	A-	8	1	1	8
282	A60205222351	Mr ABHAY PRATAP SINGH BHADORIA	100	30	70	B+	7	1	1	7
283	A60205222345	Ms ANKITA PATHAK	100	30	70	A	9	1	1	9
284	A60205222357	Mr DHRUV GUPTA	100	30	70	A-	8	1	1	8
285	A60205222270	Mr VASUDEO PANDEY	100	30	70	A-	8	1	1	8
286	A60205222367	Ms JOYA KHAN	100	30	70	A-	8	1	1	8

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287	A60205222348	Mr SHIVAM SHARMA	100	30	70	A	9	1	1	9
288	A60205222369	Ms ANSHIKA SIKARWAR	100	30	70	A	9	1	1	9
289	A60205222277	Mr ARUN SHARMA	100	30	70	B	6	1	1	6
290	A60205222370	Mr AVNISH KUMAR	100	30	70	B+	7	1	1	7
291	A60205222363	Mr JATIN GOYAL	100	30	70	A	9	1	1	9
292	A60205222287	Mr SURYAVEER SINGH GURJAR	100	30	70	A	9	1	1	9
293	A60205222298	Ms SHREYA	100	30	70	B-	5	1	1	5
294	A60205222300	Ms KHUSHI PAL	100	30	70	B-	5	1	1	5
295	A60205222334	Mr MOHIT SINGH	100	30	70	A-	8	1	1	8
296	A60205222350	Ms PRIYA RAJPUT	100	30	70	A	9	1	1	9
297	A60205222356	Mr AMAN SHUKLA	100	30	70	A	9	1	1	9
298	A60205222364	Ms MAHI JAIN	100	30	70	A-	8	1	1	8

Average Grade Point = 2044 /298 (Total Grade point/Total no of students) =6.8

No of students getting greater than average (6.8) marks = 221 students = 74.16

Total No. of Students	=	298

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Level 3	> 60% Average marks	74.16
Attainment Level		Level 3

Note: Attainment Level

Level 1	<50% - Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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Gwalior
Madhya Pradesh

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AMITY UNIVERSITY

MADHYA PRADESH

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

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : Software Engineering Lab
Course Code : CSE625, Crédits : 01, Session :2023-24(odd Sem.), Class : BCA 6 Sem
Faculty Name : Dr. Jhankar Moolchandani

1. **Introduction**

The course provides a practical implementation of the fundamentals principles of software engineering. The organization broadly is based on the classical analysis-design-implementation framework.

2. **Course Outcomes**

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

CO1- Ability to design the proper documentation of software product.
CO2- Ability to implement the cost estimation modelling approaches.
CO3- Ability to use the unified modelling language as a tool.

3. Syllabus

- Learning the concepts of Feasibility Study. **(2 Hours)**
- Understanding the concepts of Software Documentation. **(2 Hours)**
- Learning Project Management activities and techniques for designing of software. **(2 Hours)**
- Getting familiarized with the Unified Modelling Language (UML) Environment. **(2 Hours)**
- Working with the Use-case View of UML. **(2 Hours)**
- Working with the Class Diagrams of UML. **(2 Hours)**
- Working with the State Diagrams of UML. **(2 Hours)**
- Working with the Activity Diagrams of UML. **(2 Hours)**
- Working with the Collaboration Diagrams of UML. **(2 Hours)**
- Study of cost estimation modelling approaches in Software Engineering. **(2 Hours)**

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Examination Scheme:

IA			EE			
A	**PR**	**Practical Based Test**	**Major Experiment**	**Minor Experiment**	**LR**	**Viva**
5	10	15	35	15	10	10

A.

Note: IA – Internal Assessment, EE - External Exam, A - Attendance, PR- Performance, LR – Lab Record, V – Viva.

4. Lab Plan

Lab Session	**Program Name**	**Mapped CO**	**Mode of Assessing CO**
Lab 1	Learning the concepts of Feasibility Study.	**CO1**	Viva/Quiz/Practical Performance
Lab 2	Understanding the concepts of Software Documentation.	**CO1**	Viva/Quiz/Practical Performance
Lab 3	Learning Project Management activities and techniques for designing of software.	**CO1**	Viva/Quiz/Practical Performance
Lab 4	Getting familiarized with the Unified Modelling Language (UML) Environment.	**CO2**	Viva/Quiz/Practical Performance
Lab 5	Working with the Use-case View of UML.	**CO2**	Viva/Quiz/Practical Performance
Lab 6	Working with the Class Diagrams of UML.	**CO1**	Viva/Quiz/Practical Performance
Lab 7	Working with the State Diagrams of UML.	**CO2**	Viva/Quiz/Practical Performance

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Lab 8	Working with the Activity Diagrams of UML.	**CO3**	Viva/Quiz/Practical Performance
Lab 9	Working with the Collaboration Diagrams of UML.	**CO3**	Viva/Quiz/Practical Performance
Lab 10	Study of cost estimation modelling approaches in Software Engineering.	**CO2**	Viva/Quiz/Practical Performance

5. 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**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	**1**	**2**	**--**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**1**	**--**
CO2	**1**	**1**	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**--**	**1**	**--**
CO3	**1**	**2**	**1**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**2**	**1**

1: strongly related, 2: moderately related and 3: weakly related

Result Attainment

S. No.	Enrollment.No.	Student's Name	CSE625 SOFTWARE ENGINEERING LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U14G14
1	A60204821001	Ms ARYA NAIR	100	30	70	A+	10	1	1	10
2	A60204821002	Mr AYUSHMAN MISHRA	100	30	70	A+	10	1	1	10
3	A60204821003	Ms SHRADHA GUPTA	100	30	70	A+	10	1	1	10
4	A60204821004	Mr VINAYAK KATARA	100	30	70	A+	10	1	1	10
5	A60204821005	Mr ABHISHEK PANDEY	100	30	70	A	9	1	1	9
6	A60204821006	Ms MANSI CHANDANI	100	30	70	A+	10	1	1	10
7	A60204[illegible]								1	10

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	8									
8	A602048210009	Mr ANUBHAV SHAKYA	100	30	70	A+	10	1	1	10
9	A60204821010	Mr DILIP KUMAR	100	30	70	A+	10	1	1	10
10	A60204821012	Mr SHASHIKANT KESHAR-WANI	100	30	70	A+	10	1	1	10
11	A60204821015	Ms GARVITA SINGHAL	100	30	70	A+	10	1	1	10
12	A60204821017	Mr BALRAM SINGH TOMAR	100	30	70	A	9	1	1	9
13	A60204821019	Ms NIKITA TOMAR	100	30	70	A+	10	1	1	10
14	A60204821020	Mr SUJAL PAL	100	30	70	A+	10	1	1	10
15	A60204821021	Mr ANKIT KUMAR JHA	100	30	70	A	9	1	1	9
16	A60204821022	Mr PRAHLAD GAUR	100	30	70	A+	10	1	1	10

Average Grade Point = 157/16 (Total Grade point/Total no of students) = 9.81
No of students getting greater than average (9.81) marks = 13 students =81.25%

Total No. of Students		16
Level 1	50% average marks	81.09%
Attainment Level		Level 3

Note: Attainment Level

Level 1	50% average marks and
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average mark

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AMITY UNIVERSITY

MADHYA PRADESH

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

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : CYBER SECURITY AND PRIVACY IN IOT
Course Code : CSI 501, Crédits : 03, Session :2023-24(Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Kuldeep Narayan Tripathi

A. **Introduction:** The objective of this course is to understand the Security requirements in IoT, cryptographic fundamentals for IoT, authentication credentials and access control and various types Trust models and Cloud Security.

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

CSI501.1. Understand the concept of IoT security and security requirements in IoT.

CSI501.2. Apply cryptographic techniques in IoT.

CSI501.3. Analyze the requirements of authentication credentials, Identity & Access Management Solutions for IoT.

CSI501.4. Analyze various types of privacy preservation and Trust models for IoT.

CSI501.5. Understand the need and scope of Cloud security for IoT.

C. **Program Outcomes:**

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societa[illegible] relevant to the

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professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[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

[PO.12]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leaderin a team, to manage projects and in multidisciplinary environments

D. Program Specific Outcomes:

PSO1: Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2: Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3: Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/ Q/HA	10%

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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%
Total			**100%**

F.

F. Syllabus

Module I: Introduction: Securing the Internet of Things:

Security Requirements in IoT Architecture - Security in Enabling Technologies - Security Concerns in IoT Applications. Security Architecture in the Internet of Things -Security Requirements in IoT - Insufficient Authentication/Authorization - Insecure Access Control - Threats to Access Control, Privacy, and Availability - Attacks Specific to IoT. Vulnerabilities – Secrecy and Secret-Key Capacity - Authentication/Authorization for Smart Devices - Transport Encryption – Attack & Fault trees.

Module II: Cryptographic Fundamentals for IOT:

Cryptographic primitives and its role in IoT – Encryption and Decryption – Hashes – Digital Signatures – Random number generation – Cipher suites – key management fundamentals – cryptographic controls built into IoT messaging and communication protocols – IoT Node Authentication.

Module III: Identity & Access Management Solutions for IOT:

Identity lifecycle – authentication credentials – IoT IAM infrastructure – Authorization with Publish / Subscribe schemes – access control.

Module IV: Privacy Preservation and Trust Models for IOT:

Concerns in data dissemination – Lightweight and robust schemes for Privacy protection – Trust and Trust models for IoT – self-organizing Things - Preventing unauthorized access.

Module V: Cloud Security for IoT Cloud Services and IOT:

Offerings related to IoT from cloud service providers – Cloud IoT security controls – enterprise IoT cloud security architecture – New directions in cloud enabled IoT computing.

G. Examination Scheme:

Components	**A**	**CT**	**S/V/Q/HA**	**EE**
Weightage (%)	5	15	10	70

H.

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

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H. Suggested Text/Reference Books:

- Practical Internet of Things Security (Kindle Edition) by Brian Russell, Drew Van Duren Securing the Internet of Things Elsevier.
- Security and Privacy in Internet of Things (IoTs): Models, Algorithms, and Implementations.
- Thomas Erl, Ricardo Puttini, ZaighamMahmood, Cloud Computing: Concepts, Technology & Architecture, Prentice Hall, 2013.
- Cyber Security Law Thoughts on IoT, AI & Blockchain by Pavan Duggal.

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Security Requirements in IoT Architecture	Lecture	CSI501.1	Mid Term-1, Quiz & End Sem Exam
2	Security in Enabling Technologies	Lecture	CSI501.1	Mid Term-1, Quiz & End Sem Exam
3	Security Concerns in IoT Applications	Lecture	CSI501.1	Mid Term-1, Quiz & End Sem Exam
4	*Security Architecture in the IoT, Security Requirements in IoT*	Lecture	CSI501.1	Mid Term-1, Quiz & End Sem Exam
5	Insufficient Authentication/Authorization	Lecture	CSI501.1	Mid Term-1, Quiz & End Sem Exam
6	Insecure Access Control, Threats to Access Control, Privacy, and	Lecture	CSI501.1	Mid Term-1, Quiz & End Sem

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	Availability			Exam
7	Attacks Specific to IoT	Lect ure	CSI501.1	Mid Term-1, Quiz & End Sem Exam
8	Vulnerabilities, Secrecy and Secret-Key Capacity	Lect ure	CSI501.1	Mid Term-1, Quiz & End Sem Exam
9	Authentication/Author ization for Smart Devices	Lect ure	CSI501.1	Mid Term-1, Quiz & End Sem Exam
10	Transport Encryption, Attack & Fault trees	Lect ure	CSI501.1	Mid Term-1, Quiz & End Sem Exam
11	Cryptographic primitives and its role in IoT,	Lect ure	CSI501.2	Mid Term-1, Quiz & End Sem Exam
12	Encryption and Decryption	Lect ure	CSI501.2	Mid Term-1, Quiz & End Sem Exam
13	Encryption/Decryption methods	Lect ure	CSI501.2	Mid Term-1, Quiz & End Sem Exam
14	Hashes, Digital Signatures	Lect ure	CSI501.2	Mid Term-1, Quiz & End Sem Exam

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15	Random number generation, Cipher suites	Lecture	CSI501.2	Mid Term-1, Quiz & End Sem Exam
16	Key management fundamentals	Lecture	CSI501.2	Mid Term-1, Quiz & End Sem Exam
17	Cryptographic controls built into IoT messaging and communication protocols	Lecture	CSI501.2	Mid Term-1, Quiz & End Sem Exam
18	IoT Node Authentication	Lecture	CSI501.2	Mid Term-1, Quiz & End Sem Exam
19	Identity lifecycle	Lecture	CSI501.3	Mid Term-1, Quiz & End Sem Exam
20	Authentication Credentials	Lecture	CSI501.3	Mid Term-1, Quiz & End Sem Exam
21	IoT IAM infrastructure	Lecture	CSI501.3	Quiz & End Sem Exam
22	Authorization with Publish / Subscribe schemes	Lecture	CSI501.3	Quiz & End Sem Exam
23	Access Control	Lecture	CSI501.3	Quiz & End Sem Exam
24	Access Management Solutions	Lecture	CSI501.3	Quiz & End Sem Exam

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25	Concerns in data dissemination	Lecture	CSI501.4	Quiz & End Sem Exam
26	Privacy Preservation in IoT	Lecture	CSI501.4	Quiz & End Sem Exam
27	Lightweight and robust schemes for Privacy protection	Lecture	CSI501.4	Quiz & End Sem Exam
28	Trust and Trust models for IoT	Lecture	CSI501.4	Quiz & End Sem Exam
29	Self-organizing Things	Lecture	CSI501.4	Quiz & End Sem Exam
30	Preventing unauthorized access	Lecture	CSI501.4	Quiz & End Sem Exam
31	Cloud Computing basics	Lecture	CSI501.5	Quiz & End Sem Exam
32	IoT and Cloud	Lecture	CSI501.5	Quiz & End Sem Exam
33	Offerings related to IoT from cloud service providers	Lecture	CSI501.5	Quiz & End Sem Exam
34	Cloud IoT security controls	Lecture	CSI501.5	Quiz & End Sem Exam
35	Enterprise IoT cloud security architecture	Lecture	CSI501.5	Quiz & End Sem Exam
36	New directions in cloud enabled IoT computing	Lecture	CSI501.5	Quiz & End Sem Exam

J.

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

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CSI5011.1	Understand the concept of IoT security and security requirements in IoT.															
CSI5011.2	Apply cryptographic techniques in IoT	2														

	.															
CSI501.3	Analyze the requirements of authentication credentia	2	1												1	

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	ls, Identity & Access Management Solutions for IoT.															
CSI5011.	Analyze	2	1												1	

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4	variousstypesofprivacypreservationandTrustmodelsforIo															

	T.															
CSI501.5	Understandtheneedandscopeof Cloudsecurityfor IoT															

	.															

ATTAINMENT

ESE Marks – CSI 501, CYBER SECURITY AND PRIVACY IN IOT

S. No.	Enrollment.No.	Student's Name	CSI501 CYBER SECURITY AND PRIVACY IN IOT							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U4G4
1	A60205221046	Mr YASIR KHAN	100	30	70	B+	7	3	3	21
2	A60205221062	Mr MAYANK BOHARE	100	30	70	A-	8	3	3	24
3	A60205221101	Mr ANUBHAV KHANDELWAL	100	30	70	A+	10	3	3	30
4	A60205221065	Mr ABHISHEK SINGH	100	30	70	A+	10	3	3	30
5	A60205221078	Ms ISHU KUSHWAH	100	30	70	B+	7	3	3	21
6	A60205221083	Mr RAJ SHARMA	100	30	70	A+	10	3	3	30
7	A60205221107	Mr ANURAG SINGH BHADORIA	100	30	70	A	9	3	3	27
8	A60205221127	Mr MADHUR GUPTA	100	30	70	A	9	3	3	27
9	A60205221156	Mr RAJ SINGH RAJAWAT	100	30	70	B+	7	3	3	21

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10	A60205221093	Mr RAHUL SINGH DHAKAD	100	30	70	A	9	3	3	27
11	A60205221158	Mr ABHISHEKH SINGH	100	30	70	A	9	3	3	27
12	A60205221259	Mr KARAN KUMAR CHAURASIA	100	30	70	A+	10	3	3	30
13	A60205221270	Ms YASHIKA UPADHYAY	100	30	70	A+	10	3	3	30
14	A60205221301	Ms ANGEL RAJPUT	100	30	70	A	9	3	3	27
							124			

Average Grade Point = 124/14 (Total Grade point/Total no of students) = 8.85
No of students getting greater than average (8.85) marks = 10 students = 71.4%

Total No. of Students	**=**	**14**
Level 3	> 60% Average marks	**71.4%**
Attainment Level		**Level 3**

Note: Attainment Level

Level 1	<50% - Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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AMITY UNIVERSITY

MADHYA PRADESH

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

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : CYBER SECURITY AND PRIVACY IN IOT LAB
Course Code : CSI 521, Crédits : 01, Session :2023-24(Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name : Dr. Kuldeep Narayan Tripathi

A. **Introduction:** The objective of this course is to understand key terms and concepts in cyber law, intellectual property and cyber-crimes, trademarks and domain theft. Moreover, it also helps to understand important cyber security legal principles that need to be made as an integral component and part of the growth and further evolution of emerging technologies like Internet of Things.

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

CSI521.1. Describe and analyze the hardware, software, components of a network and the interrelations.

CSI521.2. Implement different security solutions for the various IoT Applications.

CSI521.3. Develop solutions for networking and security problems, balancing business concerns, technical issues and security.

CSI521.4 Implement a model to demonstrate working of network of communicating devices.

CSI521.5 Analyze different types of authentication and authorization techniques and its compatibility with IoT.

C. Program Outcomes:

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5] s, and modern

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engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[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

[PO.12]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leaderin a team, to manage projects and in multidisciplinary environments

D. Program Specific Outcomes:

PSO1: Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2: Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3: Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

E. Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuous Internal Evaluation	Mid Term Viva	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/ Q/HA	10%

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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 Examinatio n	End Semester Practical Examination	EE	70%
Total			**100%**

F.

F. Syllabus

1. How implement security and privacy concerns in IOT: (2 Hours)
2. Implement Android-based Smartphone Security using IOT: (2 Hours)
3. How can-do Stepping Stone Detection using IOT: (2 Hours)
4. How Broken Authentication and Session Management Vulnerabilities in IOT: (2 Hours)
5. Use of Computer Forensic Investigation and Cyber Terrorism: (2 Hours)
6. How is underlying architecture of internet of things is different from web of things explain with help of example: (2 Hours)
7. Construct a model to demonstrate working of network of communicating devices with help of suitable diagram: (2 Hours)
8. State the following with example: Public cloud, Private cloud, Hybrid cloud and Community cloud: (2 Hours)
9. Example of identity-based authentication in IOT: (2 Hours)
10. Example of public-key-based authentication in IOT: (2 Hours)

G. Examination Scheme:

IA			EE			
A	**PR**	**Practical Based Test**	**Major Experiment**	**Minor Experiment**	**LR**	**Viva**
5	10	15	35	15	10	10

Note: IA –Internal Assessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V – Viva.

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H. Suggested Text/Reference Books:

- Practical Internet of Things Security (Kindle Edition) by Brian Russell, Drew Van Duren Securing the Internet of Things Elsevier.
- Security and Privacy in Internet of Things (IoTs): Models, Algorithms, and Implementations.
- Thomas Erl, Ricardo Puttini, ZaighamMahmood, Cloud Computing: Concepts, Technology & Architecture, Prentice Hall, 2013.
- Cyber Security Law Thoughts on IoT, AI & Blockchain by Pavan Duggal.

I. Lab Plan

Practical	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Discussion about various networking concepts related to IoT.	Practical	CSI521.1	Mid Term Viva, Quiz & End Sem Practical Exam
2	Various Security Concerns in IoT Applications.	Practical	CSI521.1	Mid Term Viva, Quiz & End Sem

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				Practical Exam
3	How implement security and privacy concerns in IOT.	Practical	CSI521.2	Mid Term Viva, Quiz & End Sem Practical Exam
4	Implement Android-based Smartphone Security using IOT.	Practical	CSI521.2	Mid Term Viva, Quiz & End Sem Practical Exam
5	Stepping Stone Detection using IOT.	Practical	CSI521.3	Mid Term Viva, Quiz & End Sem Practical Exam
6	Broken Authentication and Session Management Vulnerabilities in IOT.	Practical	CSI521.3	Mid Term Viva, Quiz & End Sem Practical Exam
7	Use of Computer Forensic Investigation and Cyber Terrorism.	Practical	CSI521.3	Quiz & End Sem Practical Exam
8	How is underlying architecture of internet of things is different from web of things explain with help of example.	Practical	CSI521.4	Quiz & End Sem Practical Exam

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9	Demonstrate working of network of communicating devices with help of suitable diagram.	Practical	CSI521.4	Quiz & End Sem Practical Exam
10	State the following with example: Public cloud, Private cloud, Hybrid cloud and Community cloud.	Practical	CSI521.5	Quiz & End Sem Practical Exam
11	Example of identity-based authentication in IOT.	Practical	CSI521.5	Quiz & End Sem Practical Exam
12	Example of public-key-based authentication in IOT.	Practical	CSI521.5	Quiz & End Sem Practical Exam

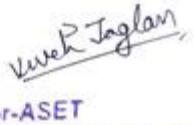
J.

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSI521.1	Describean		1													

	d a n a l y z e t h e h a r d w a r e , s o f t w a r e , c o m p o n e n t s o f a n e t w o r k a n d																

	theinterrelations.															
CSI5211.2	Implementdifferentsecuritysolutio	2												1		



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	nsfor thevariousIoTApplications.															
CSI5211.3	Developsolutionsforn	2		1												

	e t w o r k i n g a n d s e c u r i t y p r o b l e m s , b a l a n c i n g b u s i n e s s c o n c e r																

	ns, technicalissuesandsecurity.															
CSI5211.4	Implementamodeltodemo	2		1										1		

	nstrateworkingofnetworkofcommunicatingdevices.															

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CSI5211.5	Analyzedifferentiatypesofauthenticationandauthorizatio		2														

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	ntechniquesanditscompatibilitywithIoT.															

ATTAINMENT

ESE Marks – CSI 521, CYBER SECURITY AND PRIVACY IN IOT LAB

S. No.	Enrollment.No.	Student's Name	**CSI521** CYBER SECURITY AND PRIVACY IN IOT LAB

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			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U4G4
1	A60205221046	Mr YASIR KHAN	100	30	70	A+	10	1	1	10
2	A60205221062	Mr MAYANK BOHARE	100	30	70	A	9	1	1	9
3	A60205221101	Mr ANUBHAV KHANDELWAL	100	30	70	A+	10	1	1	10
4	A60205221065	Mr ABHISHEK SINGH	100	30	70	A	9	1	1	9
5	A60205221078	Ms ISHU KUSHWAH	100	30	70	A	9	1	1	9
6	A60205221083	Mr RAJ SHARMA	100	30	70	A	9	1	1	9
7	A60205221107	Mr ANURAG SINGH BHADORIA	100	30	70	A	9	1	1	9
8	A60205221127	Mr MADHUR GUPTA	100	30	70	A+	10	1	1	10
9	A60205221156	Mr RAJ SINGH RAJAWAT	100	30	70	A+	10	1	1	10
10	A60205221093	Mr RAHUL SINGH DHAKAD	100	30	70	A+	10	1	1	10
11	A60205221158	Mr ABHISHEKH SINGH	100	30	70	A+	10	1	1	10
12	A60205221259	Mr KARAN KUMAR CHAURASIA	100	30	70	A+	10	1	1	10
13	A60205221270	Ms YASHIKA UPADHYAY	100	30	70	A+	10	1	1	10
14	A60205221301	Ms ANGEL RAJPUT	100	30	70	A+	10	1	1	10
							135			

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Average Grade Point = 135/14 (Total Grade point/Total no of students) = 9.64
No of students getting greater than average (9.64) marks = 9 students = 64%

Total No. of Students	**=**	**14**
Level 3	> 60% Average marks	**64%**
Attainment Level		**Level 3**

Note: Attainment Level

Level 1	<50% - Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : INTRODUCTION TO ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
Course Code : CSA 101, Crédits : 03, Session :2023-24(Odd Sem.), Class : B.Tech. I Year
Faculty Name :

A. **Introduction*:*** The main purpose of this course is to provide the most fundamental knowledge about Artificial Intelligence and Machine Learning. It will provide an understanding of the basic techniques for building intelligent computer systems and an understanding of cognitive science.

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

CSA101.1. Demonstrate a fundamental understanding of artificial intelligence (AI) and Machine Learning (ML).

CSA101.2. Understand the concepts of knowledge management and representation in AI and ML.

CSA101.3. Apply AI and ML algorithms for various problems.

CSA101.4. Analyse the computational cognitive modelling and decision-making systems.

CSA101.5. Build the classical models for various problems like searching, constraint satisfaction.

C. **Programme Outcomes:**

[PO.1].Engineeringknowledge:Applytheknowledgeofmathematics,science,engineeringfundamentals,andanengineeringspecializationtothesolutionofcomplexengineeringproblems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineeringproblems reaching substantiated conclusions using first principles of mathematics, natural sciences,andengineeringsciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and designsystem components or processes that meet the specified needs with appropriate consideration forthepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of theinformationtoprovidevalidconclusions

[PO.5].Moderntoolusage:Create,select,andapplyappropriatetechniques,resources,andmodernengineering and IT tools including prediction and modeling to complex engineering activities with anunderstandingofthelimitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to theprofessionalengineeringpractice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutionsinsocietalandenvironmentalcontexts,anddemonstratetheknowledgeof, andneedforsustainabledevelopment

[PO.8] andno esponsibilities

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[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverseteams,andinmultidisciplinarysettings

[PO.10].**Communication**:Communicateeffectivelyoncomplexengineeringactivitieswiththeengineering community and with society at large, such as, being able to comprehend and write effective reports anddesigndocumentation,makeeffectivepresentations,andgiveandreceiveclearinstructions

[PO.11].**Projectmanagementandfinance**:Demonstrateknowledgeandunderstandingoftheengineering andmanagementprinciplesandapplythesetoone'sownwork,asamemberandleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments

[PO.12].**Life-longlearning**:Recognizetheneedfor,andhavethepreparationandabilitytoengageinindependent andlife-longlearninginthebroadestcontextoftechnologicalchange

D. Programme Specific Outcomes:

PSO1. Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Presentation		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

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F. Syllabus

ModuleI:Introduction:(6Hours)

DefinitionsofArtificialIntelligence,AIProblems,ProductionSystems,State SpaceRepresentation,BranchesofArtificialIntelligence,ApplicationsofAI.HeuristicSearchTechniques,Problem Reduction.

ModuleII:KnowledgeRepresentation:(6Hours)

KnowledgeManagement,TypesofKnowledge,KnowledgeRepresentation,ApproachestoKnowledgeRepresentation,IssuesinKnowledgeRepresentation,KnowledgeRepresentationStructures,ExpertSystems

ModuleIII:MachineLearning:(6Hours)

TypesofLearning,TypesofProblemsinMachineLearning,History ofMachineLearning,LearningSystems,Intelligent Agents, ReinforcementLearning, Supervised and Unsupervised Learning, Real-TimeApplications of AIandMachineLearning

ModuleIV:CognitiveScience:(6Hours)

Declarative/logic-basedcomputationalcognitivemodeling,connectionistmodelsofcognition,adynamicalsystemsapproachtocognition.Computationalmodelsofepisodicandsemanticmemory,memoryandlearning.

ModuleV:CognitionandArtificialIntelligence:(6Hours)

Classicalmodels of rationality,symbolicreasoning and decision making; Formal models ofinductive generalization,causality,categorizationandsimilarity;the roleofanalogyinproblemsolving,

G. 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

H. Suggested Text/Reference Books:

- Chandra S.S.V, Artificial Intelligence and Machine Learning, Prentice Hall Ind ia Learning Private Limited; 1 edition (2014)
- Russell, Artificial Intelligence 3e: A Modern Approach, Pearson Education India; 3 edition (2015)
- Machine Learning by SaikatDutt , Subramanian Chandramouli, Pearson Education; First edition (1 October 2018)
- The Cambridge Handbook of Computational Psychology, Ron Sun (ed.), Cambridge University Press (2008)

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Definitions of Artificial Intelligence, AI Problems	Lecture	CSA101.1	Mid Term-1, Quiz & End Sem Exam
2	Production Systems, State Space Representation	Lecture	CSA101.1	Mid Term-1, Quiz & End Sem Exam
3	Branches of Artificial Intelligence	Lecture	CSA101.1	Mid Term-1, Quiz & End Sem Exam
4	Applications of AI	Lecture	CSA101.1	Mid Term-1, Quiz & End Sem Exam
5	Heuristic Search Techniques	Lecture	CSA101.1	Mid Term-1, Quiz & End Sem Exam
6	Problem Reduction	Lecture	CSA101.1	Mid Term-1, Quiz & xam
7				1, Quiz & xam
8				1, Quiz &

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				End Sem Exam
9	Approaches to Knowledge Representation	Lecture	CSA101.2	Mid Term-1, Quiz & End Sem Exam
10	Issues in Knowledge Representation	Lecture	CSA101.2	Mid Term-1, Quiz & End Sem Exam
11	Knowledge Representation Structures	Lecture	CSA101.2	Mid Term-1, Quiz & End Sem Exam
12	Knowledge Representation Structures	Lecture	CSA101.2	Mid Term-1, Quiz & End Sem Exam
13	Expert Systems	Lecture	CSA101.2	Mid Term-1, Quiz & End Sem Exam
14	Types of Learning, Types of Problems in Machine Learning	Lecture	CSA101.3	Mid Term-1, Quiz & End Sem Exam
15	History of Machine Learning, Learning Systems	Lecture	CSA101.3	Mid Term-1, Quiz & End Sem Exam
16	Intelligent Agents	Lecture	CSA101.3	Mid Term-1, Quiz & End Sem Exam
17	Reinforcement Learning	Lecture	CSA101.3	Mid Term-1, Quiz & End Sem Exam
18	Supervised and Unsupervised Learning	Lecture	CSA101.3	Mid Term-1, Quiz & End Sem Exam
19	Real-Time Applications of AI and Machine Learning	Lecture	CSA101.3	Mid Term-1, Quiz & End Sem Exam
20	Real-Time Applications of AI and Machine Learning	Lecture	CSA101.3	Mid Term-1, Quiz & End Sem Exam
21	Declarative/logic-based computational cognitive modeling	Lecture	CSA101.4	Mid Term-1, Quiz & End Sem Exam
22	Connectionist models of cognition	Lecture	CSA101.4	Mid Term-1, Quiz & End Sem Exam
23	The dynamical systems approach to cognition	Lecture	CSA101.4	Assignment , Quiz & End Sem Exam
24	Computational models of episodic memory	Lecture	CSA101.4	Assignment, Quiz & End Sem Exam
25	Computational models of episodic memory	Lecture	CSA101.4	Assignment, Quiz & End Sem Exam
26	Computational models of semantic memory	Lecture	CSA101.4	Assignment, Quiz & End Sem Exam
27	Computational models of semantic memory	Lecture	CSA101.4	Assignment, Quiz & End Sem Exam
28	Memory and learning	Lecture	CSA101.4	Assignment, Quiz & End Sem Exam
29	Classical models of rationality	Lecture	CSA101.5	Assignment, Quiz & End Sem Exam
30	Symbolic reasoning and decision making	Lecture	CSA101.5	Assignment, Quiz & End Sem Exam
31	Formal models of inductive generalization	Lecture	CSA101.5	Assignment, Quiz & End Sem Exam
32	Causality	Lecture	CSA101.5	Assignment, Quiz & End Sem Exam
33				t, Quiz & xam
34				on, Quiz &

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	similarity			End Sem Exam
35	the role of analogy in problem solving	Lecture	CSA101.5	Presentation, Quiz & End Sem Exam
36	the role of analogy in problem solving	Lecture	CSA101.5	Presentation, Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSA101.1	Demonstrate a fundamental understanding of artificial intelligence (AI) and Machine Learning (ML).	3												1		
CSA101.2	Understand the concepts of knowledge management and representation in AI and ML.	1												1		
CSA101.3	Apply AI and ML algorithms for various problems	2												2		
CSA101.4	Analyse the computational cognitive modelling and decision-making systems	2	3											2		
CSA101.5	Build the classical models for various problems like searching, constraint	2	2	1	2	3								3		

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ATTAINMENT

ESE CSA101 INTRODUCTION TO ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

S.No.	Enrollment.No.	Student's Name	CSA101							
			INTRODUCTION TO ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U2G2
1	A60205223031	Mr SHUBHANG SINGH TOMAR	100	30	70	A	9	3	3	27
2	A60205223029	Ms ARADHYA VERMA	100	30	70	A-	8	3	3	24
3	A60205223006	Mr SAMBHAV SHRIVASTAVA	100	30	70	A-	8	3	3	24
4	A60205223002	Mr NAVNEET SINGH	100	30	70	A	9	3	3	27
5	A60205223005	Mr VISHAL SINGH RATHORE	100	30	70	A-	8	3	3	24
6	A60205223003	Mr ADITYA RAJPUT	100	30	70	B+	7	3	3	21
7	A60205223046	Mr KULDEEP SINGH	100	30	70	B+	7	3	3	21
8	A60205223030	Mr SATYAM TOMAR	100	30	70	A	9	3	3	27
9	A60205223 9								3	24

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10	A60205223007	Mr AMIT RAJ	100	30	70	B+	7	3	3	21
11	A60205223018	Mr SURYA PRATAP SINGH BHADOURIYA	100	30	70	A-	8	3	3	24
12	A60205223027	Mr SHIVARYAN OJHA	100	30	70	B+	7	3	3	21
13	A60205223017	Mr URVESH SHEKHAWAT	100	30	70	A-	8	3	3	24
14	A60205223048	Mr AARUSH CHATURVEDI	100	30	70	F	0	3	0	0
15	A60205223047	Mr HARSH BHARGAVA	100	30	70	B	6	3	3	18
16	A60205223056	Ms PRIYA GAUTAM	100	30	70	B	6	3	3	18
17	A60205223033	Mr RAHUL AGRAWAL	100	30	70	B	6	3	3	18
18	A60205223014	Mr NISHANT KUMAR	100	30	70	B+	7	3	3	21
19	A60205223035	Mr TANISH NEHRA	100	30	70	A	9	3	3	27
20	A60205223038	Mr SAKSHAM SHRIVASTAVA	100	30	70	B	6	3	3	18
21	A60205223072	Ms ROSHANI GOYANAR	100	30	70	A-	8	3	3	24
22	A60205223055	Mr PRATEEK GAUTAM	100	30	70	B+	7	3	3	21
23	A60205223020	Mr DHEERAJ KUMAR	100	30	70	A	9	3	3	27
24	A60205223043	Mr GAURAV VERMA	100	30	70	A-	8	3	3	24
25	A60205223042	Ms TASNEEM YAQUB	100	30	70	B+	7	3	3	21
26	A60205223081	Mr BHAVISHYA YAGIK	100	30	70	B	6	3	3	18
27	A6020522?2								3	18

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28	A60205223023	Mr RAJAT DUA	100	30	70	A-	8	3	3	24
29	A60205223049	Mr AMAN RAJAWAT	100	30	70	B+	7	3	3	21
30	A60205223091	Mr SURAJ SINGH	100	30	70	B+	7	3	3	21
31	A60205223069	Mr HARSHIT SINGH BHADORIA	100	30	70	F	0	3	0	0
32	A60205223084	Mr RAHUL PRAJAPATI	100	30	70	B+	7	3	3	21
33	A60205223050	Mr KARTIK SONI	100	30	70	A-	8	3	3	24
34	A60205223044	Mr ARYAN GUPTA	100	30	70	F	0	3	0	0
35	A60205223105	Mr HARSH VARDHAN SINGH KUSHWAH	100	30	70	B+	7	3	3	21
36	A60205223071	Mr PRASHANT SINGH	100	30	70	B	6	3	3	18
37	A60205223039	Ms TANUSHKA PANDEY	100	30	70	A-	8	3	3	24
38	A60205223059	Mr FAIJAN	100	30	70	B+	7	3	3	21
39	A60205223080	Mr NAMAN SHARMA	100	30	70	B+	7	3	3	21
40	A60205223077	Ms SHAURYA SHARMA	100	30	70	A-	8	3	3	24
41	A60205223058	Mr SAMBHAV SHARMA	100	30	70	A	9	3	3	27
42	A60205223125	Mr GUNDE VISHNUVARDHAN NAIDU	100	30	70	A+	10	3	3	30
43	A60205223060	Ms SANCHITA JAIN	100	30	70	B+	7	3	3	21
44	A6020522[illegible]8								3	27

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45	A6020522311 8	Mr PARAS AGRAWAL	100	30	70	A+	10	3	3	30
46	A6020522308 2	Mr MUKUL SHARMA	100	30	70	B	6	3	3	18
47	A6020522306 6	Mr PRIYAM SINGH	100	30	70	A+	10	3	3	30
48	A6020522312 1	Ms ADITI MISHRA	100	30	70	B+	7	3	3	21
49	A6020522307 8	Ms VAISHNAVI BHADORIYA	100	30	70	A-	8	3	3	24
50	A6020522310 2	Mr JATIN BHARTI	100	30	70	UF M	0	3	0	0
51	A6020522313 0	Ms VAISHNAVI SRIVASTAVA	100	30	70	A-	8	3	3	24
52	A6020522310 4	Mr AARAV DANDOTIYA	100	30	70	A-	8	3	3	24
53	A6020522308 6	Mr ABHINAV KOSTA	100	30	70	A-	8	3	3	24
54	A6020522312 3	Mr RAJ YADAV	100	30	70	B+	7	3	3	21
55	A6020522308 3	Ms NANDINI GUPTA	100	30	70	B+	7	3	3	21
56	A6020522311 7	Mr ARMAN RAJPUT	100	30	70	B+	7	3	3	21
57	A6020522314 0	Mr ARJUN AGRAWAL	100	30	70	A	9	3	3	27
58	A6020522311 4	Mr ANIRUDDH DIXIT	100	30	70	B+	7	3	3	21
59	A6020522314 4	Mr ADITYA RATHORE	100	30	70	B+	7	3	3	21
60	A6020522309 4	Ms NISHPRIYA JAIN	100	30	70	A-	8	3	3	24
61	A6020522313 2	Ms DIVYANSHI SHRIVASTAV	100	30	70	A	9	3	3	27
62	A6020522315 6	Ms PRIYANKA							3	30

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63	A60205223124	Mr YASH RAJ JAIN	100	30	70	B+	7	3	3	21
64	A60205223155	Mr AADESH SHARMA	100	30	70	A	9	3	3	27
65	A60205223153	Mr SACHIN SINGH TOMAR	100	30	70	B	6	3	3	18
66	A60205223098	Mr ADITYA KRISHAN SHARMA	100	30	70	A-	8	3	3	24
67	A60205223149	Mr AMIT KUSHWAH	100	30	70	B+	7	3	3	21
68	A60205223187	Mr ARYAN DWIVEDI	100	30	70	A	9	3	3	27
69	A60205223169	Mr BRAHMJEET SINGH	100	30	70	B+	7	3	3	21
70	A60205223128	Mr VIVEK UPADHYAY	100	30	70	A	9	3	3	27
71	A60205223141	Mr BRAJESH SHARMA	100	30	70	A-	8	3	3	24
72	A60205223165	Mr ASHWIN PANDEY	100	30	70	B+	7	3	3	21
73	A60205223189	Mr MOHIT SINGH NARWARIA	100	30	70	B+	7	3	3	21
74	A60205223112	Mr RAJVARDHAN SINGH CHAUHAN	100	30	70	B+	7	3	3	21
75	A60205223151	Mr APOORV PARASHAR	100	30	70	A	9	3	3	27
76	A60205223138	Ms YASHIKA GUPTA	100	30	70	A-	8	3	3	24
77	A60205223175	Mr SRIJAN SHAKYA	100	30	70	B-	5	3	3	15
78	A60205223186	Mr SANYAM SINGH	100	30	70	A-	8	3	3	24
79	A60205223173	Mr VANSH PRATAP SINGH							3	21
80	A6020522[illegible]								3	27

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	7	BHATT								
81	A60205223142	Ms MANSHA ABIDI	100	30	70	B+	7	3	3	21
82	A60205223161	Mr PRATYUSH SHARMA	100	30	70	B+	7	3	3	21
83	A60205223120	Ms ANURADHA TOMAR	100	30	70	B	6	3	3	18
84	A60205223177	Mr ANUJ SHARMA	100	30	70	F	0	3	0	0
85	A60205223166	Mr FAHAD ALI	100	30	70	B+	7	3	3	21
86	A60205223204	Mr TARUN SHARMA	100	30	70	A-	8	3	3	24
87	A60205223209	Mr ASHUTOSH VERMA	100	30	70	B+	7	3	3	21
88	A60205223191	Mr ALOK SINGH TOMAR	100	30	70	A	9	3	3	27
89	A60205223220	Mr DEV GUPTA	100	30	70	A-	8	3	3	24
90	A60205223222	Mr ANURAG VERMA	100	30	70	A-	8	3	3	24
91	A60205223192	Mr PIYUSH YADAV	100	30	70	B+	7	3	3	21
92	A60205223279	Mr ARYAN RAJPUT	100	30	70	B	6	3	3	18
93	A60205223238	Ms CHARVI DIXIT	100	30	70	DE	0	3	0	0
94	A60205223146	Mr SACHIN PRAJAPATI	100	30	70	A+	10	3	3	30
95	A60205223206	Mr ARYAN	100	30	70	B	6	3	3	18
96	A60205223179	Mr PIYUSH KUMAR SAKET	100	30	70	DE	0	3	0	0
97	A60205223201	Mr PRINCE [illegible]	100	30	70	F	0	3	0	0
98	A6020522[illegible]								3	24

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	6	RATHORE								
99	A60205223246	Mr VUPPULURI SREENATH REDDY	100	30	70	A-	8	3	3	24
100	A60205223256	Mr JATIN SANKHYAN	100	30	70	A-	8	3	3	24
101	A60205223208	Ms SAKSHI TOMAR	100	30	70	A-	8	3	3	24
102	A60205223224	Mr NITIN SIKARWAR	100	30	70	B-	5	3	3	15
103	A60205223180	Ms CHETNA BHARTI	100	30	70	A-	8	3	3	24
104	A60205223215	Mr SHIVANSH STHAPAK	100	30	70	DE	0	3	0	0
105	A60205223288	Mr SHIVAM	100	30	70	A	9	3	3	27
106	A60205223164	Ms KESHAR GUPTA	100	30	70	B+	7	3	3	21
107	A60205223265	Mr PRABAL PRATAP SINGH KAURAV	100	30	70	B+	7	3	3	21
108	A60205223211	Ms SHIKHA BHADORIA	100	30	70	B+	7	3	3	21
109	A60205223250	Mr UTAKARSH SINGH THAKUR	100	30	70	A-	8	3	3	24
110	A60205223213	Mr PIYUSH GAUTAM	100	30	70	B+	7	3	3	21
111	A60205223232	Mr AMAN SINGH	100	30	70	A-	8	3	3	24
112	A60205223219	Ms JANVI TOMAR	100	30	70	A	9	3	3	27
113	A60205223296	Ms MEGHA SHARMA	100	30	70	B+	7	3	3	21
114	A60205223255	Mr SHREYASH KUMAR							3	21
115	A6020522[illegible]								3	27

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	5	BANSAL								
116	A60205223223	Ms NANDINI SAXENA	100	30	70	A-	8	3	3	24
117	A60205223229	Mr KARTIKEY RATHORE	100	30	70	A	9	3	3	27
118	A60205223237	Mr PURANJAY SARASWAT	100	30	70	B	6	3	3	18
119	A60205223297	Mr ANUKRATI CHAUHAN	100	30	70	A-	8	3	3	24
120	A60205223245	Ms ASTHA SHARMA	100	30	70	B	6	3	3	18
121	A60205223236	Mr SONU	100	30	70	A-	8	3	3	24
122	A60205223244	Ms ANUSHKA SAHU	100	30	70	A-	8	3	3	24
123	A60205223309	Ms SONA UPADHYAY	100	30	70	B	6	3	3	18
124	A60205223263	Ms MANASVI BANSAL	100	30	70	A-	8	3	3	24
125	A60205223301	Mr SOMYA SHUKLA	100	30	70	F	0	3	0	0
126	A60205223249	Mr ANKU KUMAR SINGH	100	30	70	B+	7	3	3	21
127	A60205223259	Mr AYUSH PATEL	100	30	70	A-	8	3	3	24
128	A60205223252	Mr SHIVAM JHA	100	30	70	A-	8	3	3	24
129	A60205223315	Mr YASH SINGH TOMAR	100	30	70	B	6	3	3	18
130	A60205223268	Mr SAKSHAM SINGH TOMAR	100	30	70	B+	7	3	3	21
131	A60205223258	Ms ARPITA VERMA	100	30	70	A	9	3	3	27
132	A60205223312	Ms KANISHKA AGARWAL	100	30	70	A	9	3	3	27
133	A6020522[illegible]								3	21

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	5	TRIPATHI								
134	A60205223251	Mr AKASH JHA	100	30	70	B+	7	3	3	21
135	A60205223253	Mr PRAKHAR DWIVEDI	100	30	70	A	9	3	3	27
136	A60205223269	Ms SAURABH KUSHWAH	100	30	70	A-	8	3	3	24
137	A60205223292	Mr PUSHKER SEN	100	30	70	B+	7	3	3	21
138	A60205223254	Mr MADHAV SHARMA	100	30	70	B	6	3	3	18
139	A60205223293	Mr SANDEEP SINGH KUSHWAH	100	30	70	A-	8	3	3	24
140	A60205223270	Ms ADITI GUPTA	100	30	70	A	9	3	3	27
141	A60205223273	Mr AYUSH TIWARI	100	30	70	A	9	3	3	27
142	A60205223322	Mr DEVASHISH RAJORIYA	100	30	70	B+	7	3	3	21
143	A60205223320	Ms SONIYA TOMAR	100	30	70	A	9	3	3	27
144	A60205223284	Mr CHANDRESH SINGH BHADORIYA	100	30	70	B	6	3	3	18
145	A60205223287	Mr PRATHAM DAVID	100	30	70	B+	7	3	3	21
146	A60205223300	Mr AYUSH	100	30	70	DE	0	3	0	0
147	A60205223317	Mr PARTHSARTHI SHARMA	100	30	70	F	0	3	0	0
148	A60205223302	Mr SIDDHARTH SINGH RAJAWAT	100	30	70	B+	7	3	3	21
149	A60205223321	Ms MEGHA BAGHEL	100	30	70	B+	7	3	3	21

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Average Grade Point = 1042 /149 (Total Grade point/Total no of students) = 6.9

No of students getting greater than average (6.9) marks = students = 117 = 78.5%

Total No. of Students	**=**	**149**
Level 3	> 60% Average marks	**78.5**
Attainment Level		**Level 3**

Note: Attainment Level

Level 1	<50% - Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course: ARTIFICIAL INTELLIGENCE FOR ROBOTICS
Course Code : **CSA 501**, Crédits : 03, Session :2023-24(Odd Sem.), Class : B.Tech. 3rd Year
Faculty Name: Ms. Anshita Shukla

A. Introduction: The main objective is to teach basic methods in Artificial Intelligence, including: probabilistic inference, planning and search, localization, tracking and control, all with a focus on robotics.

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

CSA501.1. Understand the basic components of robots.

CSA501.2. Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation and learning.

CSA501.3. Implement and design a reactive model for robotics.

CSA501.4. Analyze various sensing techniques that can be implemented for reactive robots.

CSA501.5. Study of detection of the object and path tracing using vision sensor.

C. Program Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. nsibilities and norms

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PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. 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.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Program Specific Outcomes:

PSO1. Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur and a zest for higher studies.

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	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%
Total			**100%**

F. Syllabus

Module I: Introduction:

Robotics, Components of Robot, Robotic Paradigms, History of Robotics, Representative Architectures, Advantages ar

Module II: R

Prception in Behaviors, Schema Theory, Attributes of Reactive Paradigm, Potential Fields Methodologies, Evaluation of Reactive Architectures

Module III: Designing a Reactive: Implementation:
Behaviors as Objects in OOP, Steps in Designing a Reactive Behavioral System, Finite state automata

Module IV: Common Sensing Techniques for Reactive Robots:
Logical sensors, Designing a sensor suite, Proprioceptive Sensors, Proximity Sensors, Computer Vision, CCD Camera, Range From Vision, Laser Ranging

Module V: Navigation:
Topological Path Planning, Metric Path Planning, Localization and Map Making, Applications and Expectations of Robotics.

Text & References:
Text:

- Robin R. Murphy, Introduction to AI Robotics 2e (Intelligent Robotics and Autonomous Agents series), MIT Press; 1st edition (9 January 2001)

References:

- Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.
- Golub, G.,H., and Van Loan,C.,F., Matrix Computations, JHU Press,2013.
- Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education, 2004.

G. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction: Robotics	Lecture	CSA501.1	Mid Term-1& End Sem Exam
2	Components of Robot	Lecture	CSA501.1	Mid Term-1 & End Sem Exam
3	Robotic Paradigms	Lecture	CSA501.1	Mid Term-1 & End Sem Exam
4	History of Robotics	Lecture	CSA501.1	Mid Term-1 &End Sem Exam
5	History of Robotics	Lecture	CSA501.1	Mid Term-1 & End Sem Exam
6	Representative Architectures	Lecture	CSA501.1	Mid Term-1 & End Sem Exam
7				Mid Term-1 & End Sem Exam
8				Mid

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				Term-1& End Sem Exam
9	Prception in Behaviors	Lecture	CSA501.2	Mid Term-1 & End Sem Exam
10	Schema Theory	Lecture	CSA501.2	Mid Term-1 & End Sem Exam
11	Attributes of Reactive Paradigm	Lecture	CSA501.2	Mid Term-1& End Sem Exam
12	Attributes of Reactive Paradigm	Lecture	CSA501.2	Mid Term-1& End Sem Exam
13	Potential Fields Methodologies	Lecture	CSA501.2	Mid Term-1 & End Sem Exam
14	Evaluation of Reactive Architectures	Lecture	CSA501.2	Mid Term-1 & End Sem Exam
15	Evaluation of Reactive Architectures	Lecture	CSA501.3	Mid Term-1 & End Sem Exam
16	Designing a Reactive: Implementation	Lecture	CSA501.3	Mid Term-1& End Sem Exam
17	Behaviors as Objects in OOP	Lecture	CSA501.3	Mid Term-1 & End Sem Exam
18	Steps in Designing a Reactive Behavioral System	Lecture	CSA501.3	Mid Term-1 & End Sem Exam
19	Steps in Designing a Reactive Behavioral System	Lecture	CSA501.3	Mid Term-1 & End Sem Exam
20	Finite state automata	Lecture	CSA501.3	Mid Term-1 & End Sem Exam
21	Finite state automata	Lecture	CSA501.3	Mid Term-1& End Sem Exam
22				Mid Term-1& End Sem

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				Exam
23	Logical sensors	Lecture	CSA501.4	Mid Term-1& End Sem Exam
24	Designing a sensor suite	Lecture	CSA501.4	Mid Term-1& End Sem Exam
25	Proprioceptive Sensors	Lecture	CSA501.4	Quiz & End Sem Exam
26	Proximity Sensors	Lecture	CSA501.4	Quiz & End Sem Exam
27	Computer Vision	Lecture	CSA501.4	Quiz & End Sem Exam
28	Computer Vision	Lecture	CSA501.4	Quiz & End Sem Exam
29	CCD Camera	Lecture	CSA501.5	Quiz & End Sem Exam
30	Range From Vision	Lecture	CSA501.5	Quiz & End Sem Exam
31	Laser Ranging	Lecture	CSA501.5	Quiz & End Sem Exam
32	Navigation: Topological Path Planning	Lecture	CSA501.5	Quiz & End Sem Exam
33	Metric Path Planning	Lecture	CSA501.5	Quiz & End Sem Exam
34	Localization and Map Making	Lecture	CSA501.5	Quiz & End Sem Exam
35	Applications and Expectations of Robotics	Lecture	CSA501.5	Quiz & End Sem Exam
36	Applications and Expectations of Robotics	Lecture	CSA501.5	Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSA501.1	Understand the basic components of robots.															
CSA501.2	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation and learning.	2														
CSA501.3	Implement and design a reactive model for robotics.	2		1										1		
CSA501.4	Analyze various sensing techniques that can be implemented for reactive robots.		2													
CSA501.5	Study of detection of the object and path tracing using vision sensor.															

ATTAINMENT

ESE CSE501ARTIFICIAL INTELLIGENCE FOR ROBOTICS

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S. No.	Enrollment.No.	Student's Name	CSA501 ARTIFICIAL INTELLIGENCE FOR ROBOTICS							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U6G6
1	A60205221001	Mr MARAMREDDY ASHISH KUMAR REDDY	100	30	70	A-	8	3	3	24
2	A60205221057	Mr MIRIYAM HEMANTH KUMAR	100	30	70	A	9	3	3	27
3	A60205221016	Mr HARSHIT SHARMA	100	30	70	B	6	3	3	18
4	A60205221021	Mr DHARMENDRA DIWAKAR	100	30	70	B+	7	3	3	21
5	A60205221034	Mr TARUN SINGH TOMAR	100	30	70	F	0	3	0	0
6	A60205221036	Ms KARTIKA CHAUHAN	100	30	70	A-	8	3	3	24
7	A60205221031	Ms MANYATA SINGH	100	30	70	A	9	3	3	27
8	A60205221033	Mr SANDEEP SHARMA	100	30	70	B+	7	3	3	21
9	A60205221071	Ms SWATI GUPTA	100	30	70	B+	7	3	3	21
10	A60205221081	Mr DEVANSH VERMA	100	30	70	B	6	3	3	18
11	A60205221013	Ms PEARL BANSAL	100	30	70	A	9	3	3	27
12	A60205221025	Mr YASH SHARMA	100	30	70	B+	7	3	3	21
13	A60205221026	Ms PRAGYA GUPTA	100	30	70	A	9	3	3	27
14	A60205221038	Ms VANDANA	100	30	70	A	9	3	3	27
15	A60205221004	Mr VISHAL KUMAR	100	30	70	A	9	3	3	27
16	A60205221022	Mr SANSKAR SONI	100	30	70	B+	7	3	3	21
17	A60205221029	Mr PRIYANSHU KUMAR	100	30	70	B+	7	3	3	21
18	A60205221047	Mr ANUSH M K	100	30	70	A-	8	3	3	24
19	A6020522100								3	24

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20	A60205221011	Ms ANDREA NARCIS	100	30	70	A-	8	3	3	24
21	A60205221066	Mr HARSHAVARDHAN CHEVADABOINA	100	30	70	B	6	3	3	18
22	A60205221041	Mr ARYAN SINGH TOMAR	100	30	70	B+	7	3	3	21
23	A60205221061	Mr DEEPENDRA SHARMA	100	30	70	A	9	3	3	27
24	A60205221018	Mr SAHIL KHAN	100	30	70	B	6	3	3	18
25	A60205221024	Ms MEGHNA GUPTA	100	30	70	A	9	3	3	27
26	A60205221027	Ms SIMRAN SINGH	100	30	70	A	9	3	3	27
27	A60205221042	Ms KRATI GOYAL	100	30	70	A-	8	3	3	24
28	A60205221059	Mr AYUSH TOMAR	100	30	70	B	6	3	3	18
29	A60205221068	Ms SHRUTI AGARWAL	100	30	70	A-	8	3	3	24
30	A60205221082	Mr MOKSH TIWARI	100	30	70	A-	8	3	3	24
31	A60205221094	Ms PURVI GUPTA	100	30	70	A-	8	3	3	24
32	A60205221074	Ms SHATAKSHI SHARMA	100	30	70	A	9	3	3	27
33	A60205221087	Mr KONJETI MOHAN SAI AKHIL	100	30	70	B+	7	3	3	21
34	A60205221099	Mr MANAV PRATAP SINGH TOMAR	100	30	70	B+	7	3	3	21
35	A60205221111	Ms VAISHALI PATEL	100	30	70	A	9	3	3	27
36	A60205221131	Mr SHIVANK SINGH BHADAURIA	100	30	70	A-	8	3	3	24
37	A60205221054	Mr HIMANSHU SINGH	100	30	70	B+	7	3	3	21
38	A60205221056	Mr MORUBOYINA VENKATA SAI AKHIL	100	30	70	B+	7	3	3	21
39	A60205221058	Mr AYUSH SHARMA	100	30	70	B+	7	3	3	21
40	A60205221085	Mr HRISHI SHARMA	100	30	70	B	6	3	3	18
41	A60205221095	Mr SURAJ SINGH TOMAR	100	30	70	A-	8	3	3	24
42	A6020522107								3	18

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43	A60205221091	Mr YUVRAJ SINGH PARIHAR	100	30	70	B+	7	3	3	21
44	A60205221098	Mr SUYASH PATHAK	100	30	70	B	6	3	3	18
45	A60205221076	Mr AKSHAT SHRIVASTAVA	100	30	70	A+	10	3	3	30
46	A60205221106	Mr ROHAN RAKSHIT	100	30	70	A-	8	3	3	24
47	A60205221109	Mr DODLA AJAY KUMAR	100	30	70	A-	8	3	3	24
48	A60205221053	Mr AYUSH SHARMA	100	30	70	B	6	3	3	18
49	A60205221064	Ms NIKHAT FATIMA	100	30	70	A+	10	3	3	30
50	A60205221079	Mr PRIYANSHU TANGAR	100	30	70	A	9	3	3	27
51	A60205221089	Ms VANSHIKA SISODIYA	100	30	70	A+	10	3	3	30
52	A60205221100	Mr ANMOL KUMAR	100	30	70	B+	7	3	3	21
53	A60205221116	Mr ISHAAN DHINGRA	100	30	70	B+	7	3	3	21
54	A60205221148	Ms SWETA	100	30	70	A	9	3	3	27
55	A60205221112	Ms SMRUTI SRADHA JENA	100	30	70	B+	7	3	3	21
56	A60205221147	Mr YASH KUMAR SAH	100	30	70	B+	7	3	3	21
57	A60205221179	Mr GAURAV SINGH	100	30	70	B	6	3	3	18
58	A60205221219	Mr NIKHIL SHARMA	100	30	70	B+	7	3	3	21
59	A60205221086	Mr SANDEEP YADAV	100	30	70	B+	7	3	3	21
60	A60205221092	Mr JAIDEEP SHARMA	100	30	70	B-	5	3	3	15
61	A60205221096	Mr ADITYA PRATAP SINGH	100	30	70	B+	7	3	3	21
62	A60205221120	Mr KUNAL RATHORE	100	30	70	C+	4	3	3	12
63	A60205221125	Mr NISHANT RAJPUT	100	30	70	B-	5	3	3	15
64	A60205221130	Mr GARVIT SINGHAL	100	30	70	C+	4	3	3	12
65	A60205221105	Mr KARANVEER SINGH RAJAWAT	100	30	70	A-	8	3	3	24
66	A6020522113								3	27

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67	A60205221149	Mr DEVANSH DUBEY	100	30	70	B-	5	3	3	15
68	A60205221150	Ms OJASVI SHARMA	100	30	70	B+	7	3	3	21
69	A60205221152	Ms KHUSHI CHAUHAN	100	30	70	A+	10	3	3	30
70	A60205221177	Mr AKHILESH SINGH TOMAR	100	30	70	B+	7	3	3	21
71	A60205221181	Mr RITHIK NAIR	100	30	70	C+	4	3	3	12
72	A60205221167	Mr AASHI GUPTA	100	30	70	A-	8	3	3	24
73	A60205221173	Ms VAISHNAVI	100	30	70	A-	8	3	3	24
74	A60205221190	Mr ROHIT KUMAR PANDEY	100	30	70	A	9	3	3	27
75	A60205221205	Ms AARUSHI SABOO	100	30	70	A	9	3	3	27
76	A60205221124	Mr ARYAN VYAS	100	30	70	B	6	3	3	18
77	A60205221140	Ms RAJVINDER KAUR	100	30	70	A-	8	3	3	24
78	A60205221141	Mr HARENDRA PRATAP SINGH BHADORIYA	100	30	70	A-	8	3	3	24
79	A60205221113	Ms ANAMIKA BAJPAI	100	30	70	B+	7	3	3	21
80	A60205221128	Mr YASH PATHAK	100	30	70	A-	8	3	3	24
81	A60205221138	Ms KHUSHBOO JAIN	100	30	70	A	9	3	3	27
82	A60205221174	Mr RITESH DWIVEDI	100	30	70	A-	8	3	3	24
83	A60205221215	Mr ROHIT JAIN	100	30	70	A-	8	3	3	24
84	A60205221188	Mr UJJWAL SHRIVASTAVA	100	30	70	A-	8	3	3	24
85	A60205221197	Ms ANSHIKA DAS	100	30	70	B+	7	3	3	21
86	A60205221201	Ms ANUSHKA TRIPATHI	100	30	70	B+	7	3	3	21
87	A60205221256	Mr VIVEK PAL	100	30	70	B+	7	3	3	21
88	A60205221228	Mr PRAHARSH RAJ SINGH	100	30	70	B+	7	3	3	21
89	A60205221262	Ms ANAMIKA RAJPUT	100	30	70	B+	7	3	3	21
90	A60205221264	Mr ARNAV SHARMA	100	30	70	A-	8	3	3	24
91	A6020522128								3	18
92	A6020522131								3	30

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		RAJAWAT								
93	A60205221153	Mr ARYAN KHAN	100	30	70	C+	4	3	3	12
94	A60205221170	Mr VIKAS PATIDAR	100	30	70	A-	8	3	3	24
95	A60205221208	Ms MOULI TIWARI	100	30	70	B	6	3	3	18
96	A60205221237	Ms GARIMA GUPTA	100	30	70	A-	8	3	3	24
97	A60205221207	Mr AKSHAT SHANDILYA	100	30	70	B	6	3	3	18
98	A60205221218	Mr VIVEK YADAV	100	30	70	B	6	3	3	18
99	A60205221227	Ms SALONI OJHA	100	30	70	A	9	1	1	9
100	A60205221261	Ms PRIYANSHI GARG	100	30	70	B+	7	1	1	7
101	A60205221277	Mr JATIN SHRIVASTAVA	100	30	70	B+	7	1	1	7
102	A60205221288	Mr VAIBHAV GARG	100	30	70	A-	8	1	1	8
103	A60205221169	Ms ARADHNA RAJORIYA	100	30	70	A	9	1	1	9
104	A60205221139	Mr RAVI SINGH TOMAR	100	30	70	B	6	1	1	6
105	A60205221154	Mr PIYUSH SINGH	100	30	70	A-	8	1	1	8
106	A60205221171	Ms METTU NAVYA SHREE	100	30	70	B-	5	1	1	5
107	A60205221178	Ms AELLI GUPTA	100	30	70	A	9	1	1	9
108	A60205221216	Mr ADITYA PATERIYA	100	30	70	A	9	1	1	9
109	A60205221220	Mr SHAILENDRA SINGH	100	30	70	B+	7	1	1	7
110	A60205221229	Ms ANANYA SINGH	100	30	70	B	6	1	1	6
111	A60205221232	Ms SAKSHI SHAHI	100	30	70	A-	8	1	1	8
112	A60205221234	Ms SHRUTI DIXIT	100	30	70	A	9	1	1	9
113	A60205221236	Ms URVASHI SHARMA	100	30	70	B+	7	1	1	7
114	A60205221241	Mr SANTOSH SINGH TOMAR	100	30	70	A	9	1	1	9
115	A60205221267	Mr AMIT RAI	100	30	70	B+	7	1	1	7
116	A6020522126								1	9
117	A6020522127								1	10

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		BHARGAVA								
118	A60205221221	Ms DIVYANSHI BHADORIA	100	30	70	A-	8	1	1	8
119	A60205221258	Ms VAISHALI PATERIYA	100	30	70	A	9	1	1	9
120	A60205221260	Ms MUSKAN MANGAL	100	30	70	A	9	1	1	9
121	A60205221305	Ms BHARTI SAHU	100	30	70	A-	8	1	1	8
122	A60205221210	Mr HARSH TIWARI	100	30	70	B	6	1	1	6
123	A60205221239	Mr AAYUSH KUMAR	100	30	70	DE	0	1	0	0
124	A60205221249	Mr PIYUSH SHUKLA	100	30	70	A	9	1	1	9
125	A60205221252	Mr RUPESH SINGH	100	30	70	B-	5	1	1	5
126	A60205221282	Mr HEMRAJ PATHAK	100	30	70	A-	8	1	1	8
127	A60205221312	Mr GAURAV VYAS	100	30	70	A-	8	1	1	8
128	A60205221298	Mr VIBHOR AGRAWAL	100	30	70	A	9	1	1	9
129	A60205221294	Ms RIYA SINGH	100	30	70	A	9	1	1	9
130	A60205221306	Mr ANKIT KAURAV	100	30	70	B+	7	1	1	7
131	A60205221266	Mr AMIT SINGH	100	30	70	B+	7	1	1	7
132	A60205221275	Mr ABHAY SINGH CHANDEL	100	30	70	B-	5	1	1	5

Average Grade Point = 975 /132 (Total Grade point/Total no of students) = 7.3

No of students

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Total No. of Students	**=**	**132**
Level 2	>50% average marks and < 60% average marks	**51.1**
Attainment Level		**Level 2**

Note: Attainment Level

Level 1	<50% - Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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AMITY UNIVERSITY

MADHYA PRADESH

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

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : INTERNET OF THINGS AND APPLICATION
Course Code : BCA 501, Crédits : 02, Session :2022-23(OddSem.), Class : BCA3rdYear
Faculty Name : Dr Harish Kumar Shakya

A. ***Introduction:*** The objective of the course is to Introduction of IOT, Understand IOT Market perspective, Data and Knowledge Management and use of Devices in IOT Technology, Understand State of the Art – IOT Architecture. Real World IOT Design Constraints, Industrial Automation and Commercial Building Automation in IOT.

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

BCA501.1 Understand the fundamental concept of the Python in Eclipse Study, Install and Demonstrate basic operations.

BCA501.2 Design the different types of Arduino, Install IDE and perform basic LED programs.

BCA501.3 Understand the concept of RFID,NFC and MQTT.

BCA501.4 Implement Arduino with Raspberry Pi and Demonstrate Raspberry Pi basic LED programs and Zigbee Protocol.

BCA501.5 Design the Design the real time projects using Arduino.

C. **Programme Outcomes:**

[PO.1].Engineeringknowledge:ApplytheknowledgeofArtificial Intelligence,Machine Learning,Expert Systemsandengineeringspecializationtothesolutionofcomplexengineeringproblems.

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineeringproblems reaching substantiated conclusions using first principles of Artificial Intelligence,Machine Learning,Expert Systems.

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and designsystem components or processes that meet the specified needs with appropriate consideration for thepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of theinformationtoprovidevalidconclusions

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[PO.5].**Moderntoolusage**:Create,select,andapplyappropriatetechniques,resources,andmodernengineering and IT tools including prediction and modeling to complex engineering activities with anunderstandingofthelimitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to theprofessionalengineeringpractice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societalandenvironmentalcontexts,anddemonstratetheknowledgeof,andneedforsustainabledevelopment

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities andnorms oftheengineeringpractices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverseteams,andinmultidisciplinarysettings

[PO.10].**Communication**:Communicateeffectivelyoncomplexengineeringactivitieswiththeengineeringcommunity and with society at large, such as, being able to comprehend and write effective reports anddesigndocumentation,makeeffectivepresentations,andgiveandreceiveclearinstructions

[PO.11].**Life-longlearning**:Recognizetheneedfor,andhavethepreparationandabilityto engageinindependent andlife-longlearninginthebroadestcontextoftechnologicalchange

[PO.12].**Projectmanagementandfinance**:Demonstrateknowledgeandunderstandingoftheengineeringandmanagementprinciplesandapplythesetoone'sownwork,asamemberandleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments.

D. Programme Specific Outcomes:

PSO1:Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO 2: Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO 3: Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%

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	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleavesincludingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

F. Syllabus

Module 1: Introduction to the Internet of Things-Key Features, advantages, disadvantages, Wearable electronics, The Basics of Sensors & Actuators, Introduction to Cloud Computing, IOT Software.

Module 2: IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management.

Module 3: The Arduino Platform – What is Arduino, Why Arduino, Driver installation, programming &Burning, Coding in wiring language, Compiling in Arduino, The Arduino Open-Microcontroller Platform, Arduino Basics, Arduino Board Layout & Architecture, Reading from Sensors.

Module 4: Arduino Programming & Interface of Sensors– LED display, PUSH button to array of LED, Communicating to and from computer, GSM, GPS and Zigbee interfacing, Interface sensor with Arduino, Programming Arduino, reading from sensor, Connecting Arduino with Mobile Device. The Android Mobile OS, Using the Bluetooth Module.

Module 5: Projects:1. Creating own Android App using MIT App Inventor & controlling Arduino connected devices. 2. Use Arduino to Upload free data from Environmental Sensors to Cloud Server. 3. Receive Automatic Call Notification on Mobile Phone for Burglar Alarm using IoT Platform4.Control Electronic Devices from anywhere across the world using Internet & Mobile App.

G. 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

H. Suggested Text/Reference Books:

Textbook:

- Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.

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Reference Books:

- Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)", 1stEdition, VPT, 2014.
- Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to ConnectingEverything", 1st Edition, Apress Publications, 2013

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction to the Internet of Things	Lecture	BCA501.1	Mid Term-1, Quiz & End Sem Exam
2	Write a Program for arithmetic operation in Python.	Lecture	BCA501.1	Mid Term-1, Quiz & End Sem Exam
3	Key Features, advantages, disadvantages	Lecture	BCA501.1	Mid Term-1, Quiz & End Sem Exam
4	Wearable electronics	Lecture	BCA501.1	Mid Term-1, Quiz & End Sem Exam
5	The Basics of Sensors & Actuators	Lecture	BCA501.1	Mid Term-1, Quiz & End Sem Exam
6	The Basics of Actuators	Lecture	BCA501.1	Mid Term-1, Quiz & End Sem Exam
7	Introduction to Cloud Computing	Lecture	BCA501.1	Mid Term-1, Quiz & End Sem Exam
8	IOT Softwares	Lecture	BCA501.2	Mid Term-1, Quiz & End Sem Exam

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9	IoT-An Architectural Overview	Lecture	BCA501.2	Mid Term-1, Quiz & End Sem Exam
10	Building an architecture	Lecture	BCA501.2	Mid Term-1, Quiz & End Sem Exam
11	Main design principles and needed capabilities	Lecture	BCA501.2	Mid Term-1, Quiz & End Sem Exam
12	An IoT architecture outline	Lecture	BCA501.2	Mid Term-1, Quiz & End Sem Exam
13	standards considerations	Lecture	BCA501.2	Mid Term-1, Quiz & End Sem Exam
14	IoT Technology Fundamentals	Lecture	BCA501.2	Mid Term-1, Quiz & End Sem Exam
15	Devices and gateways	Lecture	BCA501.2	Mid Term-1, Quiz & End Sem Exam
16	Local and wide area networking	Lecture	BCA501.3	Mid Term-1, Quiz & End Sem Exam
17	Data management	Lecture	BCA501.3	Mid Term-1, Quiz & End Sem Exam
18	Business processes in IoT	Lecture	BCA501.3	Mid Term-1, Quiz & End Sem Exam
19	Everything as a Service (XaaS)	Lecture	BCA501.3	Mid Term-1, Quiz & End Sem Exam
20	M2M and IoT Analytics	Lecture	BCA501.3	Mid Term-1, Quiz & End Sem Exam

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21	Knowledge Management	Lecture	BCA501.3	Mid Term Viva/Quiz & End Sem Practical Exam
22	The Arduino Platform	Lecture	BCA501.3	Mid Term-1, Quiz & End Sem Exam
23	What is Arduino, Why Arduino?	Lecture	BCA501.4	Mid Term-1, Quiz & End Sem Exam
24	Driver installation	Lecture	BCA501.4	Mid Term-1, Quiz & End Sem Exam
25	programming &burning	Lecture	BCA501.4	Mid Term-1, Quiz & End Sem Exam
26	Compiling in Arduino	Lecture	BCA501.4	Mid Term-1, Quiz & End Sem Exam
27	The Arduino Open-Microcontroller Platform	Lecture	BCA501.4	Mid Term-1, Quiz & End Sem Exam
28	Arduino Board Layout & Architecture	Lecture	BCA501.4	Mid Term-1, Quiz & End Sem Exam
29	Reading fromSensors	Lecture	BCA501.4	Mid Term-1, Quiz & End Sem Exam
30	Arduino Programming & Interface of Sensors	Lecture	BCA501.5	Mid Term-1, Quiz & End Sem Exam
31	LED display, PUSH button to array ofLED	Lecture	BCA501.5	Mid Term-1, Quiz & End Sem Exam
32	Communicating to and from computer	Lecture	BCA501.5	Mid Term-1, Quiz & End Sem Exam

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33	GSM, GPS and Zigbeeinterfacing	Lecture	BCA501.5	Mid Term-1, Quiz & End Sem Exam
34	Interface sensorwith Arduino, Programming Arduino,	Lecture	BCA501.5	Mid Term-1, Quiz & End Sem Exam
35	The Android Mobile OS, Using the Bluetooth Module	Lecture	BCA501.5	Mid Term-1, Quiz & End Sem Exam
36	**Projects:1.** Creating own Android App using MIT App Inventor & controlling Arduino	Lecture	BCA501.5	Mid Term-1, Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BCA501.1	Understand the fundamental concept of the Python in Eclipse Study, Install and Demonstrate basic operations.	3	1	1	1	2										
BCA501.2	Design the different types of Arduino, Install IDE and perform basic LED programs.	3	2	1	2	2										
BCA501.3	Understand the concept of RFID,NFC and MQTT.	3	2	2	2	2										
BCA501.4	Implement Arduino with Raspberry Pi and Demonstrate Raspberry Pi	3	2	2	2	2										

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	basic LED programs and Zigbee Protocol.															
BCA 501. 5	Design the Design the real time projects using Arduino.	3	2	2	2	2										

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Gwalior
Madhya Pradesh

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S. No.	Enrollment.No.	Student's Name	BCA501 INTERNET OF THINGS AND APPLICATIONS Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U10G10
1	A60204821001	Ms ARYA NAIR	100	30	70	A	9	2	2	18
2	A60204821002	Mr AYUSHMAN MISHRA	100	30	70	A	9	2	2	18
3	A60204821003	Ms SHRADHA GUPTA	100	30	70	B+	7	2	2	14
4	A60204821004	Mr VINAYAK KATARA	100	30	70	A	9	2	2	18
5	A60204821005	Mr ABHISHEK PANDEY	100	30	70	C+	4	2	2	8
6	A60204821006	Ms MANSI CHANDANI	100	30	70	B+	7	2	2	14
7	A60204821008	Mr ADITYA SHARMA	100	30	70	A	9	2	2	18
8	A60204821009	Mr ANUBHAV SHAKYA	100	30	70	A-	8	2	2	16
9	A60204821010	Mr DILIP KUMAR	100	30	70	A	9	2	2	18
10	A60204821012	Mr SHASHIKANT KESHARWANI	100	30	70	B+	7	2	2	14
11	A60204821015	Ms GARVITA SINGHAL	100	30	70	A+	10	2	2	20
12	A60204821017	Mr BALRAM SINGH TOMAR	100	30	70	B-	5	2	2	10
13	A60204821019	Ms NIKITA TOMAR	100	30	70	A-	8	2	2	16
14	A60204821020	Mr SUJAL PAL	100	30	70	A	9	2	2	18
15	A60204821021	Mr ANKIT KUMAR JHA	100	30	70	B-	5	2	2	10
16	A60204821022	Mr PRAHLAD GAUR	100	30	70	A	9	2	2	18

Average Grade Point = 124 /16 (Total Grade point/Total no of students) = 7.75
No of students getting greater than average (7.75) marks = 9 students = 56.25%

Total No. of Students	=	16
Level 2	>50% average marks and < 60% average marks	56.25%
Attainment Level		Level 2

Level 1	< 50% Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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S. No.	Enrollment.No.	Student's Name	BCA501 INTERNET OF THINGS AND APPLICATIONS							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U4G4
1	A60204921004	Ms SHATAKSHI RAJAWAT	100	30	70	A+	10	2	2	20
2	A60204921001	Ms SMRITI NAYAK	100	30	70	A	9	2	2	18
3	A60204921002	Ms ADITI KUMARI	100	30	70	A+	10	2	2	20
4	A60204921006	Mr DHRUV DWIVEDI	100	30	70	C+	4	2	2	8

Average Grade Point = 33 /4 (Total Grade point/Total no of students) = 8.25
No of students getting greater than average (8.25) marks = 3 students = 75%

Total No. of Students	=	4
Level 3	> 60% Average marks	75%
Attainment Level		Level 3

Level 1	< 50% Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : ANDROID APPLICATION DEVELOPMENT
Course Code : BCA 502, Crédits : 02, Session :2022-23 (Odd Sem.), Class : BCA. 3rd Year
Faculty Name : Dr. Madhavi Dhingra

A. **Introduction:** The objective of this course is to provides students with the knowledge of fundamentals of Android application; Android Application Development is a hands-on course which is designed for providing essential skills and experiences to the students in developing applications on mobile platform. The hands-on training is effective for beginners and experienced developers for practical Android Code Application.

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

BCA 502.1 Able to understand android architecture.

BCA 502.2 Able to understand various technologies of Android.

BCA 502.3 Able to understand working of flutter technology.

BCA 502.4 Able to understand the concept and working of widgets.

BCA 502.5 Able to create a Web Application with server controls.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex real-life problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and computer sciences.

PO3. Design/Development of Solutions: Design solutions for complex problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

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PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and IT tools including prediction and modeling to complex activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the software engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. 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.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1.Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous	Mid Term 1	CT	15%

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Internal Evaluation	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%
Total			**100%**

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F. Syllabus

Module I : (6 Hours)

Introduction to Android -Overview of Android, What does Android run On – Android Internals, Android for mobile apps development, Environment setup for Android apps Development, Framework - Android- SDK, Emulator & Android AVD.

Module-II: (6 Hours)

Introduction to Flutter- The What's and The Why's, Introduction to Dart, Reason why Dart holds the fort strong. Installing Visual Studio Code and the Dart Plugin. Installing Dart SDK. Writing the first Dart Program.

Module-III : (6 Hours)

Setting up flutter-Downloading/Cloning the Flutter SDK. Installing Flutter Plugin within VS Code. ,Understanding the structure of a Flutter Project. scratch. Widget, Widgets and their role in a Flutter app. The MaterialApp and Scaffold widget. AppBar. FloatingActionButton. More widgets - Text, Center and Padding. Hot Reload and Hot Restart, the tricks of the trade. Recreating the Default Flutter App (UI Only).

Module-IV : (6 Hours)

Stateless vs. Stateful widgets. The setState() method., Returning to the Default Flutter App.Navigation-Navigator and routes. Applying push() using MaterialPageRoute. Applying pop().Declaring parameter-less routes (pushNamed()) in MaterialApp widget. sing TextField. Handling changes to a TextField. Pass retrieved values using Navigator.

Module-V : (6 Hours)

Applying ThemeData. The Basic Screen Layout. Applying Custom Font. The 'Future' function. async' and 'await'. The 'http' package. Model Class and JSON parsing, Displaying Remote Data. (NEWS API). The 'url_launcher' package. Adding onTap() to NEWS API.

G. Examination Schemes:

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Components	A	CT	S/V/Q/HA	EE
Weightage (%)	5	15	10	70

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

H. Suggested Text/Reference Books:

- Professional Android Application Development, Reto Meier
- Beginning Android, Mark L Murphy
- Pro Android, S.Y Hashimi & Satya Komatineni
- Beginning Flutter: A Hands On Guide to App Development, Marco L. Napoli
- Google Flutter Mobile Development Quick Start Guide, Prajyot Mainkar
- Learn Google Flutter Fast, Mark Clow

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction to Android -Overview of Android	Lecture	BCA502.1	Mid Term-1, Quiz & End Sem Exam
2	Android Internals	Lecture	BCA502.1	Mid Term-1, Quiz & End Sem Exam
3	Android for mobile apps development	Lecture	BCA502.1	Mid Term-1, Quiz & End Sem Exam
4	Environment setup for Android apps Development	Lecture	BCA502.1	Mid Term-1, Quiz & End Sem Exam
5	Introduction to Flutter	Lectur	BCA502.2	Mid Term-1, Quiz & End Exam

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6	Introduction to Dart	Lec-tur e	BCA5 02.2	Mid Term-1, Quiz & End Sem Exam
7	Installing Visual Studio Code and the Dart Plugin	Lec-tur e	BCA5 02.2	Mid Term-1, Quiz & End Sem Exam
8	Installing Dart SDK.	Lec-tur e	BCA5 02.2	Mid Term-1, Quiz & End Sem Exam
9	Writing the first Dart Program.	Lec-tur e	BCA5 02.2	Mid Term-1, Quiz & End Sem Exam
10	Setting up flutter-Download-ing/Cloning the Flutter SDK	Lec-tur e	BCA5 02.3	Mid Term-1, Quiz & End Sem Exam
11	Understanding the structure of a Flutter Project	Lec-tur e	BCA5 02.3	Mid Term-1, Quiz & End Sem Exam
12	Widget, Widgets and their role in a Flutter app	Lec-tur e	BCA5 02.3	Mid Term-1, Quiz & End Sem Exam
13	The MaterialApp and Scaffold widget	Lec-tur e	BCA5 02.3	Mid Term-1, Quiz & End Sem Exam
14	Recreating the Default Flutter App (UI Only)	Lec-tur e	BCA5 02.3	Mid Term-1, Quiz & End Sem Exam
15	Stateless vs. Stateful widgets	Lec-tur e	BCA5 02.4	Mid Term-1, Quiz & End Sem Exam
16	The setState() method., Return-ing to the Default Flutter App.Navigation-Navigator and routes	Lec-tur e	BCA5 02.4	Mid Term-1, Quiz & End Sem Exam
17	Applying push() using Materi-alPageRoute. Applying pop()	Lec-tur e	BCA5 02.4	Mid Term-1, Quiz & End Sem Exam
18	Declaring parameter-less routes (push-Named()) in Materi-alApp widget.	Lec-tur e	BCA5 02.4	Mid Term-1, Quiz & End Sem Exam

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19	Handling changes to a TextField. Pass retrieved values using Navigator	Lecture	BCA502.4	Mid Term-1, Quiz & End Sem Exam
20	Applying ThemeData	Lecture	BCA502.5	Mid Term-1, Quiz & End Sem Exam
21	The Basic Screen Layout. Applying Custom Font. The 'Future' function. async' and 'await'.	Lecture	BCA502.5	Mid Term-2, Quiz & End Sem Exam
22	The 'http' package. Model Class and JSON parsing, Displaying Remote Data	Lecture	BCA502.5	Mid Term-2, Quiz & End Sem Exam
23	The 'url_launcher' package. Adding onTap() to NEWS API	Lecture	BCA502.5	Mid Term-2, Quiz & End Sem Exam
24	NEWS API	Lecture	BCA502.5	Mid Term-2, 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		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

BCA502.1	Able to understand android architecture.	1	1	1	3	2							1	2	1	1

BCA502.2	Ableto understandvariousstechnologiesofAndroid.	1	1	1	3	2								2	1	1

BCA502.3	Ableto understandworkingoffluttertechnology.	2	2	2	2	2								2	1	1

BCA502.4	Able to understand the concept and working of widgets.	3	3	2	3	2								2	2	2

BCA502.5	Ableto create a Web Application with server controls.	2	2	1	2	3							1	2	3	2

ATTAINMENT

ESE Marks – BCA 502, ANDROID APPLICATION DEVELOPMENT

S. No.	Enroll-ment.No.	Student's Name	BCA502 ANDROID APPLICATION DEVELOPMENT							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U4G4
1	A60204821001	Ms ARYA NAIR	100	30	70	A	9	2	2	18
2	A60204821002	Mr AYUSHMAN MISHRA	100	30	70	A-	8	2	2	16
3	A60204821003	Ms SHRADHA GUPTA	100	30	70	B+	7	2	2	14
4	A60204821004	Mr VINAYAK KATARA	100	30	70	B+	7	2	2	14
5	A60204821005	Mr ABHISHEK PAN-DEY	100	30	70	C+	4	2	2	8
6	A60204821006	Ms MANSI CHAN-DANI	100	30	70	B+	7	2	2	14
7	A60204821008	Mr ADITYA SHARMA	100	30	70	B+	7	2	2	14
8	A60204821009	Mr ANUBHAV SHAKYA	100	30	70	B+	7	2	2	14
9	A60204821010	Mr DILIP KUMAR	100	30	70	A	9	2	2	18
10	A60204821012	Mr SHASHIKANT KESHARWANI	100	30	70	B+	7	2	2	14
11	A60204821015	Ms GARVITA SINGHAL	100	30	70	A+	10	2	2	20
12	A60204821017	Mr BALRAM SINGH TOMAR	100	30	70	B+	7	2	2	14
13	A60204821019	Ms NIKITA TOMAR	100	30	70	A	9	2	2	18

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14	A60204821020	Mr SUJAL PAL	100	30	70	A-	8	2	2	16
15	A60204821021	Mr ANKIT KUMAR JHA	100	30	70	B+	7	2	2	14
16	A60204821022	Mr PRAHLAD GAUR	100	30	70	A	9	2	2	18
							122			

Average Grade Point = 122/16 (Total Grade point/Total no of students) = 7.6
No of students getting greater than average (7.6) marks = 7 students = 43.7%

Total No. of Students	=	**16**
Level 1	<50% - Average marks	**43.7%**
Attainment Level		**Level 1**

Note: Attainment Level

Level 1	<50% - Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : INTERNET OF THINGS (IOT) LAB
Course Code : BCA521, Crédits : 02, Session :2022-23 (OddSem.), Class : BCA3rd Year
Faculty Name : Dr. Chandrashekhar Goswami

A. ***Introduction:*** The objective of the course is to Introduction of IOT, Understand IOT Market perspective, Data and Knowledge Management and use of Devices in IOT Technology, Understand State of the Art – IOT Architecture. Real World IOT Design Constraints, Industrial Automation and Commercial Building Automation in IOT.

B. **Course Outcomes:**At the end of the course, students will be able to:
BCA501.1 Understand the fundamental concept of the Python in Eclipse Study, Install and Demonstrate basic operations.
BCA501.2 Design the different types of Arduino, Install IDE and perform basic LED programs.
BCA501.3 Understand the concept of RFID,NFC and MQTT.
BCA501.4 Implement Arduino with Raspberry Pi and Demonstrate Raspberry Pi basic LED programs and Zigbee Protocol.
BCA501.5 Design the Design the real time projects using Arduino.

C. **Programme Outcomes:**
[PO.1].Engineeringknowledge:Applytheknowledgeofmathematics,science,engineeringfundamentals,andanengineeringspecializationtothesolutionofcomplexengineeringproblems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineeringproblems reaching substantiated conclusions using first principles of mathematics, natural sciences,andengineeringsciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and designsystem components or processes that meet the specified needs with appropriate consideration for thepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of theinformationtoprovidevalidconclusions

[PO.5].Moderntoolusage:Create,select,andapplyappropriatetechniques,resources,andmodernengin

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eering and IT tools including prediction and modeling to complex engineering activities with anunderstandingofthelimitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to theprofessionalengineeringpractice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societalandenvironmentalcontexts,anddemonstratetheknowledgeof,andneedforsustainabledevelopment

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities andnorms oftheengineeringpractices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverseteams,andinmultidisciplinarysettings

[PO.10].**Communication**:Communicateeffectivelyoncomplexengineeringactivitieswiththeengineeringcommunity and with society at large, such as, being able to comprehend and write effective reports anddesigndocumentation,makeeffectivepresentations,andgiveandreceiveclearinstructions

[PO.11].**Projectmanagementandfinance**:Demonstrateknowledgeandunderstandingoftheengineeringandmanagementprinciplesandapplythesetoone'sownwork,asamemberandleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments

[PO.12].**Life-longlearning**:Recognizetheneedfor,andhavethepreparationandabilityto engageinindependent andlife-longlearninginthebroadestcontextoftechnologicalchange

D. Programme Specific Outcomes:

PSO1:Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO 2: Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO 3: Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Seminar/Viva-Voce/Quiz/Home	S/V/Q/HA	10%

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	Assignment		
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleavesincludingmedicalleaves.	A	5%
End Semester Examination	End Semester Examination	EE	70%
Total			**100%**

List of experiments/demonstrations:

1. Study and Install Python in Eclipse and WAP for data types in python.
2. Write a Program for arithmetic operation in Python.
3. Write a Program for looping statement in Python.
4. Study and Install IDE of Arduino and different types of Arduino.
5. Write program using Arduino IDE for Blink LED.
6. Write Program for RGB LED using Arduino.
7. Study the Temperature sensor and Write Program foe monitor temperature using Arduino.
8. Study and Implement RFID, NFC using Arduino.
9. Study and implement MQTT protocol using Arduino.
10. Study and Configure Raspberry Pi.
11. WAP for LED blink using Raspberry Pi.
12. Study and Implement Zigbee Protocol using Arduino / Raspberry Pi.

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:

- Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1 st Edition, Academic Press, 2014

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H. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Study and Install Python in Eclipse and WAP for data types in python.	Practical	BCA521.1	Mid Term Viva/Quiz & End Sem Practical Exam
2	Write a Program for arithmetic operation in Python.	Practical	BCA521.1	Mid Term Viva/Quiz & End Sem Practical Exam
3	Write a Program for looping statement in Python.	Practical	BCA521.2	Mid Term Viva/Quiz & End Sem Practical Exam
4	Study and Install IDE of Arduino and different types of Arduino.	Practical	BCA521.2	Mid Term Viva/Quiz & End Sem Practical Exam
5	Write program using Arduino IDE for Blink LED.	Practical	BCA521.3	Mid Term Viva/Quiz & End Sem Practical Exam
6	Write Program for RGB LED using Arduino.	Practical	BCA521.3	Mid Term Viva/Quiz & End Sem Practical Exam
7	Study the Temperature sensor and Write Program foe monitor temperature using Arduino.	Practical	BCA521.3	Mid Term Viva/Quiz & End Sem Practical Exam
8	Study and Implement RFID, NFC using Arduino.	Practical	BCA521.4	Mid Term Viva/Quiz & End Sem Practical Exam
9	Study and implement MQTT protocol using Arduino.	Practical	BCA521.4	Mid Term Viva/Quiz & End Sem Practical Exam
10	Study and Configure Raspberry Pi.	Practical	BCA521.5	Mid Term Viva/Quiz & End Sem Practical Exam

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11	WAP for LED blink using Raspberry Pi.	Practical	BCA521.5	Mid Term Viva/Quiz & End Sem Practical Exam
12	Study and Implement Zigbee Protocol using Arduino / Raspberry Pi.	Practical	BCA521.5	Mid Term Viva/Quiz & End Sem Practical Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BCA521.1	Understand the fundamental concept of the Python in Eclipse Study, Install and Demonstrate basic operations.	3	1	1	1	2				1		1	1			
BCA521.2	Design the different types of Arduino, Install IDE and perform basic LED programs.	3	2	1	2	2				1		1	1			
BCA521.3	Understand the concept of RFID,NFC and MQTT.	3	2	2	2	2				1		1	1			
BCA521.4	Implement Arduino with Raspberry Pi and Demonstrate Raspberry Pi basic LED programs and Zigbee Protocol.	3	2	1	2	2				1		1	1			
BCA521.5	Design the Design the real time projects using Arduino.	3	2	2	2	2				1		1	1			

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Madhya Pradesh

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S. No.	Enrollment.No.	Student's Name	BCA521 INTERNET OF THINGS AND APPLICATIONS LAB Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U13 G13
1	A60204821001	Ms ARYA NAIR	100	30	70	A	9	2	2	18
2	A60204821002	Mr AYUSHMAN MISHRA	100	30	70	A+	10	2	2	20
3	A60204821003	Ms SHRADHA GUPTA	100	30	70	A	9	2	2	18
4	A60204821004	Mr VINAYAK KATARA	100	30	70	A+	10	2	2	20
5	A60204821005	Mr ABHISHEK PANDEY	100	30	70	A	9	2	2	18
6	A60204821006	Ms MANSI CHANDANI	100	30	70	A	9	2	2	18
7	A60204821008	Mr ADITYA SHARMA	100	30	70	A+	10	2	2	20
8	A60204821009	Mr ANUBHAV SHAKYA	100	30	70	A+	10	2	2	20
9	A60204821010	Mr DILIP KUMAR	100	30	70	A+	10	2	2	20
10	A60204821012	Mr SHASHIKANT KESHARWANI	100	30	70	A	9	2	2	18
11	A60204821015	Ms GARVITA SINGHAL	100	30	70	A+	10	2	2	20
12	A60204821017	Mr BALRAM SINGH TOMAR	100	30	70	B+	7	2	2	14
13	A60204821019	Ms NIKITA TOMAR	100	30	70	A+	10	2	2	20
14	A60204821020	Mr SUJAL PAL	100	30	70	A	9	2	2	18
15	A60204821021	Mr ANKIT KUMAR JHA	100	30	70	A	9	2	2	18
16	A60204821022	Mr PRAHLAD GAUR	100	30	70	A+	10	2	2	20

Average Grade Point = 150 /16 (Total Grade point/Total no of students) = 9.375
No of students getting greater than average (9.375) marks = 8 students = 50%

Total No. of Students	=	16
Level 2	>50% average marks and < 60% average marks	50%
Attainment Level		Level 2

Level 1	< 50% Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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S. No.	Enrollment.No.	Student's Name	BCA521 INTERNET OF THINGS AND APPLICATIONS LAB Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U6G6
1	A60204921004	Ms SHATAKSHI RAJAWAT	100	30	70	A+	10	2	2	20
2	A60204921001	Ms SMRITI NAYAK	100	30	70	A+	10	2	2	20
3	A60204921002	Ms ADITI KUMARI	100	30	70	A+	10	2	2	20
4	A60204921006	Mr DHRUV DWIVEDI	100	30	70	A	9	2	2	18

Average Grade Point = 39 /4 (Total Grade point/Total no of students) = 9.75
No of students getting greater than average(9.75) marks = 3 students = 75%

Total No. of Students	=	4
Level 3	> 60% Average marks	75%
Attainment Level		Level 3

Level 1	< 50% Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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AMITY UNIVERSITY

MADHYA PRADESH

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

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : ANDROID APPLICATION DEVELOPMENT
Course Code : BCA 522, Crédits : 02, Session :2022-23 (Odd Sem.), Class : BCA. 3rd Year
Faculty Name : Dr. Madhavi Dhingra

A. **Introduction:** The objective of this course is to provides students with the knowledge of fundamentals of Android application; Android Application Development is a hands-on course which is designed for providing essential skills and experiences to the students in developing applications on mobile platform. The hands-on training is effective for beginners and experienced developers for practical Android Code Application.

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

BCA 522.1 Able to understand android architecture.

BCA 522.2 Able to understand various technologies of Android.

BCA 522.3 Able to understand working of flutter technology.

BCA 522.4 Able to understand the concept and working of widgets.

BCA 522.5 Able to create a Web Application with server controls.

C. Programme Outcomes:

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex real-life problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and computer sciences.

PO3. Design/Development of Solutions: Design solutions for complex problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

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PO5. Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and IT tools including prediction and modeling to complex activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and Sustainability: Understand the impact of the solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the software engineering practice.

PO9. Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. 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.

PO12. Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

D. Programme Specific Outcomes:

PSO1.Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3. Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal	Mid Term Viva	CT	15%

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Evaluation	Mid Term Viva		
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/ Q/HA	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a studentto 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%
Total			**100%**

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F. Syllabus

1. Installation and setup of java development kit (JDK), setup android SDK, setup Android Studio and android development tools (ADT) plugins, create android virtual device:**(1 Hour)**
2. Create "Hello World" application. That will display "Hello World" in the middle of the screen using TextView Widget in the red color: **(1 Hour)**
3. Create application for demonstration of android activity life cycle:**(2 Hours)**
4. Create Registration page to demonstration of Basic widgets available in android.: **(1 Hour)**
5. Create sample application with login module. (Check username and password) On successful login, Change TextView "Login Successful". And on failing login, alert user using Toast "Login fail": **(2 Hours)**
6. Create login application where you will have to validate usename and passwords. Till the username and password is not validated, login button should remain disabled: **(2 Hours)**
7. Create and Login application as above. Validate login data and display Error to user using setError() method: **(2 Hour)**
8. Create an application for demonstration of Relative and Table Layout in android: **(1 Hour)**
9. Create an application for demonstration of Scroll view in android**: (2 Hours)**
10. Create an application that will pass two number using Text View to the next screen, and on the next screen display sum of that number: **(2 Hours)**
11. Create an application that will pass two number using Text View to the next screen, and on the next screen display sum of that number: **(2 Hours)**
12. Create spinner with strings taken from resource folder (res >> value folder). On changing spinner value, change background of screen: **(2 Hours)**

G. Examination Scheme:

IA			EE			
A	**PR**	**Practical Based Test**	**Major Experiment**	**Minor Experiment**	**LR**	**Viva**
5						

H.

Note: IA – Internal Assessment, EE - External Exam, A - Attendance, PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Text/Reference Books:

- Professional Android Application Development, Reto Meier
- Beginning Android, Mark L Murphy
- Pro Android, S.Y Hashimi & Satya Komatineni
- Beginning Flutter: A Hands On Guide to App Development, Marco L. Napoli
- Google Flutter Mobile Development Quick Start Guide, Prajyot Mainkar
- Learn Google Flutter Fast, Mark Clow

I. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Installation and setup of java development kit (JDK), setup android SDK, setup Android Studio and android development tools (ADT) plugins, create android virtual device:**(1 Hour)**	Practical	BCA522.1	Mid Term-1, Quiz & End Sem Exam
2	Create "Hello World" application. That will display "Hello World" in the middle of the screen using TextView Widget in the red color: (1 Hour)	Practical	BCA522.1	Mid Term-1, Quiz & End Sem Exam
3	Create application for demonstration of android activity life cycle:(2 Hours)	Practical	BCA522.1	Mid Term-1, Quiz & End Sem Exam
4	Create Registration page to demonstration of Basic widgets available in android.: (1 Hour)	Practical	BCA522.2	Mid Term-1, Quiz & End Sem Exam

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5	Create sample application with login module. (Check username and password) On successful login, Change TextView "Login Successful". And on failing login, alert user using Toast "Login fail": (2 Hours)	Practical	BC A5 22.2	Mid Term-1, Quiz & End Sem Exam
6	Create login application where you will have to validate username and passwords. Till the username and password is not validated, login button should remain disabled: (2 Hours)	Practical	BC A5 22.2	Mid Term-1, Quiz & End Sem Exam
7	Create and Login application as above. Validate login data and display Error to user using setError() method: (2 Hour)	Practical	BC A5 22.3	Mid Term-1, Quiz & End Sem Exam
8	Create an application for demonstration of Relative and Table Layout in android: (1 Hour)	Practical	BC A5 22.3	Mid Term-1, Quiz & End Sem Exam
9	Create an application for demonstration of Scroll view in android: (2 Hours)	Practical	BC A5 22.4	Mid Term-1, Quiz & End Sem Exam
10	Create an application that will pass two number using Text View to the next screen, and on the next screen display sum of that number: (2 Hours)	Practical	BC A5 22.4	Mid Term-1, Quiz & End Sem Exam
11	Create an application that will pass two number using Text View to the next screen, and on the next screen display sum of that number: (2 Hours)	Practical	BC A5 22.5	Mid Term-1, Quiz & End Sem Exam
12	Create spinner with strings taken from resource folder (res >> value folder). On changing spinner value, change background of screen: (2 Hours)	Practical	BC A5 22.5	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		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BCA522.1	Able to understand android architect	1	1	1	3	2							1	2	1	1

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	ure.															
BCA522.2	Ableto understandvariousstechnologie	1	1	1	3	2						1	1	2	1	1

	software Android.															
BCA5222.3	Able to understand working of flutter	2	2	2	2	2								2	1	1

	technology.															
BCA5222.4	Able to understand the concept and wor	3	3	2	3									2	2	2

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	kingofwidgets.															
BCA522.5	Ableto create a Web Application wi	2	2	1	2	3								2	3	2

	t h s e r v e r c o n t r o l s .															

ATTAINMENT

ESE Marks – BCA 522, ANDROID APPLICATION DEVELOPMENT LAB

S. No.	Enroll-ment.No.	Student's Name	BCA522 ANDROID APPLICATION DEVELOPMENT LAB							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U4G4
1	A60204821001	Ms ARYA NAIR	100	30	70	A	9	2	2	18
2	A60204821002	Mr AYUSHMAN MISHRA	100	30	70	A	9	2	2	18
3	A60204821003	Ms SHRADHA GUPTA	100	30	70	A+	10	2	2	20
4	A60204821004	Mr VINAYAK KATARA	100	30	70	A+	10	2	2	20

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5	A60204821005	Mr ABHISHEK PANDEY	100	30	70	A+	10	2	2	20
6	A60204821006	Ms MANSI CHANDANI	100	30	70	A+	10	2	2	20
7	A60204821008	Mr ADITYA SHARMA	100	30	70	A	9	2	2	18
8	A60204821009	Mr ANUBHAV SHAKYA	100	30	70	A	9	2	2	18
9	A60204821010	Mr DILIP KUMAR	100	30	70	A-	8	2	2	16
10	A60204821012	Mr SHASHIKANT KESHARWANI	100	30	70	A+	10	2	2	20
11	A60204821015	Ms GARVITA SINGHAL	100	30	70	A	9	2	2	18
12	A60204821017	Mr BALRAM SINGH TOMAR	100	30	70	A+	10	2	2	20
13	A60204821019	Ms NIKITA TOMAR	100	30	70	A+	10	2	2	20
14	A60204821020	Mr SUJAL PAL	100	30	70	A+	10	2	2	20
15	A60204821021	Mr ANKIT KUMAR JHA	100	30	70	A+	10	2	2	20
16	A60204821022	Mr PRAHLAD GAUR	100	30	70	A+	10	2	2	20
							153			

Average Grade Point = 153/16 (Total Grade point/Total no of students) = 9.5
No of students getting greater than average (9.5) marks = 10 students = 43.7%

Total No. of Students	**=**	**16**
Level 3	> 60% Average marks	**62.5%**
Attainment Level		**Level 3**

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Note: Attainment Level

Level 1	<50% - Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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AMITY UNIVERSITY MADHYA PRADESH, GWALIOR
AMITY SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Bachelor of Science (BSC) CSE,Academic Year – 2021-22

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : PHP, MYSQL (OPEN SOURCE TECHNOLOGIES)
Course Code : CSE-301, Crédits : 03, Session : 2021-22 (Odd Sem.), Class : B.Tech. 2ndYear
Faculty Name : Dr. Dinesh Sharma

A. ***Introduction:***This course is aimed to provide a fundamental understanding of web site creation. PHP is the language used for development of most common web sites. Syllabus includes basic and advanced features of PHP which includes detailed introduction of PHP and MYSQL, Arrays, Loops and variables etc

B. **Course Outcomes:**At the end of the course, students will be able to:
CSE304.1 Describe and use the features and syntax of programming language PHP
CSE304.2. Create, translates, and process HTML information using the Common Gateway Information (CGI) protocol.
CSE304.3. Apply PHP code to produce outcomes and solve problems.
CSE304.4. Display and insert data using PHP and MySQL. Retrieve, insert, update, and delete data from the relational database MySQL
CSE304.5.Test, debug, and deploy web pages containing PHP and MySQL

Programme Outcomes:

[PO.1].Engineeringknowledge:Applytheknowledgeofmathematics,science,engineeringfundamentals,andanengineeringspecializationtothesolutionofcomplexengineeringproblems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineeringproblems reaching substantiated conclusions using first principles of mathematics, natural sciences,andengineeringsciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and designsystem components or processes that meet the specified needs with appropriate consideration for thepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations

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[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of theinformationtoprovidevalidconclusions

[PO.5].**Moderntoolusage**:Create,select,andapplyappropriatetechniques,resources,andmodernengineering and IT tools including prediction and modeling to complex engineering activities with anunderstandingofthelimitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to theprofessionalengineeringpractice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societalandenvironmentalcontexts,anddemonstratetheknowledgeof,andneedforsustainabledevelopment

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities andnorms oftheengineeringpractices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverseteams,andinmultidisciplinarysettings

[PO.10].**Communication**:Communicateeffectivelyoncomplexengineeringactivitieswiththeengineeringcommunity and with society at large, such as, being able to comprehend and write effective reports anddesigndocumentation,makeeffectivepresentations,andgiveandreceiveclearinstructions

[PO.11].**Projectmanagementandfinance**:Demonstrateknowledgeandunderstandingoftheengineeringandmanagementprinciplesandapplythesetoone'sownwork,asamemberandleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments

[PO.12].**Life-longlearning**:Recognizetheneedfor,andhavethepreparationandabilityto engageinindependent andlife-longlearninginthebroadestcontextoftechnologicalchange

C. Programme Specific Outcomes:

PSO1: Will beabletodesign,developandimplementefficientsoftwareforagivenreallifeproblem.

PSO 2: Will be able to apply knowledge of AI, Machine Learning and Data Mining in analyzing big data forextractingusefulinformationfromitandforperformingpredictiveanalysis.

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

D. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term 1	CT	15%
	Quiz		

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	Seminar/Viva-Voce/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%
Total			**100%**

E. Syllabus

Module I: Fundamental of PHP

Introduction to PHP Evaluation of Php, Basic Syntax, Defining variable and constant, Php Data type, Operator and Expression. Decisions and loop Making Decisions, Doing Repetitive task with looping, Mixing Decisions and looping with Html.

Module II: Function and Array

Function What is a function, Define a function, Call by value and Call by reference, Recursive function, String Creating and accessing, String Searching & Replacing String, Formatting String, String Related Library function Array Anatomy of an Array, Creating index based and Associative array Accessing array, Element Looping with Index based array, Looping with associative array using each () and foreach(), Some useful Library function.

Module III: Database Connectivity with Mysql

Database Connectivity with MySql: Introduction to RDBMS, Connection with MySql Database, Performing basic database operation (DML) (Insert, Delete, Update, Select), Setting query parameter, Executing queryJoin (Cross joins, Inner joins, Outer Joins, Self joins.

Module IV: Exception Handling

Exception Handling Understanding Exception and error, Try, catch, throw. Error tracking and debugging

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:

- The Joy of PHP Programming: A Beginner's Guide – by Alan Forbes.
- PHP & MySQL Novice to Ninja – by Kevin Yank.

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- Head First PHP & MySQL – by Lynn Beighley& Michael Morrison.
- Murach's PHP & MySQL – by Joel Murach& Ray Harris.
- PHP: A Beginner's Guide – by VikramVaswani

H. Lecture Plan

Lecture	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction to PHP Evaluation of Php	Lecture	BSC301.1	Mid Term-1 & End Sem Exam
2	Basic Syntax, Defining variable	Lecture	BSC301.1	Mid Term-1 & End Sem Exam
3	Constant, Php Data type	Lecture	BSC301.1	Mid Term-1 & End Sem Exam
4	Operator and Expression	Lecture	BSC301.1	Mid Term-1 & End Sem Exam
5	Decisions and loop Making Decisions	Lecture	BSC301.1	Mid Term-1 & End Sem Exam
6	Doing Repetitive task with looping	Lecture	BSC301.1	Mid Term-1 & End Sem Exam
7	Mixing Decisions and looping with Html	Lecture	BSC301.1	Mid Term-1 & End Sem Exam
8	Function What is a function,	Lecture	BSC301.2	Mid Term-1 & End Sem Exam
9	Define a function, Call by value and Call by reference	Lecture	BSC301.2	Mid Term-1 & End Sem Exam
10	Recursive function, String Creating and accessing	Lecture	BSC301.2	Mid Term-1 & End Sem Exam
11	String Searching & Replacing String	Lecture	BSC301.2	Mid Term-1& End Sem Exam
12	Formatting String, String Related Library function Array Anatomy of an Array	Lecture	BSC301.2	Mid Term-1 & End Sem Exam
13	Creating index based and Associative array Accessing array	Lecture	BSC301.2	Mid Term-1 & End Sem Exam
14	Element Looping with Index based array	Lecture	BSC301.2	Mid Term-1 & End Sem Exam
15	Looping with associative array using each () and foreach()	Lecture	BSC301.2	Mid Term-1 & End Sem Exam
16	Some useful Library function.	Lecture	BSC301.2	Mid Term-1 & End Sem Exam
17	Database Connectivity with MySql	Lecture	BSC301.3	Quiz & End Sem Exam
18	Introduction to RDBMS, Connection with MySql Database	Lecture	BSC301.3	Quiz & End Sem Exam

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19	Performing basic database operation (DML)	Lecture	BSC301.3	Quiz & End Sem Exam
20	Setting query parameter, Executing queryJoin	Lecture	BSC301.3	Quiz & End Sem Exam
21	Exception Handling	Lecture	BSC301.4	Quiz & End Sem Exam
22	Understanding Exception and error	Lecture	BSC301.4	Quiz & End Sem Exam
23	Try, catch, throw.	Lecture	BSC301.4	Quiz & End Sem Exam
24	Error tracking and debugging.	Lecture	BSC301.4	Quiz & End Sem Exam

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

CO	STATEMENT	CORRELATION WITH PROGRAMME OUTCOMES												CORRELATION WITH PROGRAMME SPECIFIC OUTCOMES		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BSC301.1	Introduction to PHP Evaluation of Php, Basic Syntax, Defining variable and constant, Php Data type, Operator and Expression. Decisions and loop Making Decisions, Doing Repetitive task with looping, Mixing Decisions and looping with Html.	1	1	3	1	2				2				3	2	3

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BSC301.2	Function What is a function, Define a function, Call by value and Call by reference, Recursive function, String Creating and accessing, String Searching & Replacing String, Formatting String, String Related Library function Array Anatomy of an Array, Creating index based and Associative array Accessing array, Element Looping with Index based array, Looping with associative array using each () and foreach(), Some useful Library function.	1	1	3	1	2				3				2	2	3
BSC301.3	Database Connectivity with MySql: Introduction to RDBMS, Connection with MySql Database, Performing basic database operation (DML) (Insert, Delete, Update, Select), Setting	1	1	3	1	2				3				3	3	3

	query parameter, Executing queryJoin (Cross joins, Inner joins, Outer Joins, Self joins.)															
BSC301.4	Exception Handling Understanding Exception and error, Try, catch, throw. Error tracking and debugging.	1	1	3	1	2				3				2	2	3

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

S. No.	Enrollment.No.	Student's Name	**BSC301** OPEN SOURCE TECHNOLOGIES (PHP, MYSQL) Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U4G4
1	A60204922004	Mr ARNAV SHRIVASTAV	100	30	70	B	6	2	2	12
2	A60204922005	Ms ASTHA PATEL	100	30	70	B+	7	2	2	14
3	A60204922010	Mr PIYUSH TRIPATHI	100	30	70	C+	4	2	2	8
4	A60204922008	Mr ABHAY KUMAR PRASAD	100	30	70	A-	8	2	2	16
5	A60204922009	Ms RIYA CHOUDHARY	100	30	70	B+	7	2	2	14
6	A60204922007	Ms SAKSHI SURYAVANSHI	100	30	70	A	9	2	2	18

Average Grade Point = 41/6 (Total Grade point/Total no of students) = 6.83
No of students getting greater than average (6.83) marks = 4 students = 66.66%

Total No. of Students	=	6
Level 3	> 60% Average marks	66.66%
Attainment Level		Level 3

Level 1	< 50% Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : OPEN SOURCE TECHNOLOGIES (PHP, MySql) LAB
Course Code : BSc321, Crédits : 01, Session :2022-23(Odd Sem.), Class : B.Sc2nd Year
Faculty Name : Dr. Harish Kumar Shakya

A. **Introduction:**This course is aimed to provide a fundamental understanding of web site creation. PHP is the language used for development of most common web sites. Syllabus includes basic andadvanced features of PHP which includes detailed introduction of PHP and MYSQL, Arrays, Loops and variables etc.

B. **Course Outcomes:**At the end of the course, students will be able to:
BSc321.1. Write PHP code to produce outcomes and solve problems.
BSc321.2. Display and insert data using PHP and MySQL.
BSc321.3. Test, debug, and deploy web pages containing PHP and MySQL.

C. **Programme Outcomes:**
[PO.1].**Engineeringknowledge**:Applytheknowledgeofmathematics,science,engineeringfundamentals,andanengineeringspecializationtothesolutionofcomplexengineeringproblems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineeringproblems reaching substantiated conclusions using first principles of mathematics, natural sciences,andengineeringsciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and designsystem components or processes that meet the specified needs with appropriate consideration for thepublichealthandsafety,andthecultural,societal,andenvironmentalconsiderations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of theinformationtoprovidevalidconclusions

[PO.5].**Moderntoolusage**:Create,select,andapplyappropriatetechniques,resources,andmodernengineering and IT tools including prediction and modeling to complex engineering activities with anunderstandingofthelimitations
[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal, and cultural issues, and the consequent responsibilities relevant to theprofessionalengineeringpractice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societalandenvironmentalcontexts anddemonstratetheknowledgeof andneedforsustainabledevelopment.
[PO.8] esponsibilities andno

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[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverseteams,andinmultidisciplinarysettings

[PO.10].**Communication**:Communicateeffectivelyoncomplexengineeringactivitieswiththeengineering community and with society at large, such as, being able to comprehend and write effective reports anddesigndocumentation,makeeffectivepresentations,andgiveandreceiveclearinstructions

[PO.11].**Life-longlearning**:Recognizetheneedfor,andhavethepreparationandabilityto engageinindependent andlife-longlearninginthebroadestcontextoftechnologicalchange

[PO.12].**Projectmanagementandfinance**:Demonstrateknowledgeandunderstandingoftheengineering andmanagementprinciplesandapplythesetoone'sownwork,asamemberandleaderinateam,tomanageprojectsandinmultidisciplinaryenvironments

D. Programme Specific Outcomes:

PSO1:Professional Skills: An ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2: Problem-solving skills: An ability to apply standard practices and strategies insoftware project development using open-ended programming environments to deliver a quality product for business success.

PSO3: Successful career and Entrepreneurship: An ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

E. Assessment Plan:

Component of Evaluation	**Description**	**Code**	**Weightage %**
Continuous Internal Evaluation	Mid Term Viva	CT	15%
	Seminar/Viva-Voce/Quiz/Home Assignment	S/V/Q/HA	10%
Attendance	A minimum of 75% Attendance isrequiredtobemaintainedbyastudentto be qualified for taking up the EndSemester examination. The allowanceof 25%includesalltypesofleaves includingmedicalleaves.	A	5%
End Semester Examination	End Semester Practical Examination	EE	70%
Total			**100%**

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F. Syllabus

Lab Experiments are based on the course open source technologies (php, mysql)
Lab assignment will be as following:

1. WAP to develop a student Registration Form using HTML. (2 Hours)
2. WAP to show the scrolling text using Marquee Element using HTML. (2 Hours)
3. WAP to draw a table with three rows and three columns. (2 Hours)
4. WAP to show Image Mapping. (2 Hours)
5. Write the process of installation of web server. (2 Hours)
6. Write programs to print all details of your php sever. Use phpinfo().(2 Hours)
7. Write a program to give demo of ECHO and PRINT command. (2 Hours)
8. Write a program sort ten number by using array. (2 Hours)
9. Create a database in MySql and connect that database from PHP. (2 Hours)
10. Write a program to Update, insert and delete the values of table in Question No – 9 database. (2 Hours)

G. Examination Scheme:

IA			EE			
A	**PR**	**Practical Based Test**	**Major Experiment**	**Minor Experiment**	**LR**	**Viva**
5	10	15	35	15	10	10

Note: IA –Internal Assessment, EE- External Exam, A- Attendance PR- Performance, LR – Lab Record, V – Viva.

H. Suggested Text/Reference Books:

Text:

- Dive Into HTML5 by Mark Pilgrim
- Beginning PHP, Apache, MySQL Web Development
- Michael K. Glass, Yann Le Scouarnec, Elizabeth Naramore, Gary Mailer, Jeremy Stolz, Jason Gerner

References:

- Learning PHP, MySQL, books by ‘ O’ riley Press

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I. Lab Plan

Practical	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	WAP to develop a student Registration Form using HTML.	Practical	BSc321.1	Mid Term Viva, Quiz & End Sem Practical Exam
2	WAP to show the scrolling text using Marquee Element using HTML.	Practical	BSc321.1	Mid Term Viva, Quiz & End Sem Practical Exam
3	WAP to draw a table with three rows and three columns	Practical	BSc321.1	Mid Term Viva, Quiz & End Sem Practical Exam
4	WAP to show Image Mapping.	Practical	BSc321.2	Mid Term Viva, Quiz & End Sem Practical Exam
5	Write the process of installation of web server.	Practical	BSc321.2	Mid Term Viva, Quiz & End Sem Practical Exam
6	Write programs to print all details of your php sever. Use phpinfo()	Practical	BSc321.2	Mid Term Viva, Quiz & End Sem Practical Exam
7	Write a program to give demo of ECHO and PRINT command.	Practical	BSc321.3	Quiz & End Sem Practical Exam
8	Write a program sort ten number by using array.	Practical	BSc321.3	Quiz & End Sem Practical Exam
9	Create a database in MySql and connect that database from PHP.	Practical	BSc321.3	Quiz & End Sem Practical Exam
10	Write a program to Update, insert and delete the values of table in Question No – 9 database.	Practical	BSc321.4	Quiz & End Sem Practical Exam
11	Project 1	Practical	BSc321.4	Quiz & End Sem Practical Exam
12	Internal examination	Practical	BSc321.4	Quiz & End Sem Practical 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		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BSc321.1	Write PHP code to produce outcomes and solve problems.	2	3	3										3	2	
BSc321.2	Display and insert data using PHP and MySQL.	2	3	3										3	2	
BSc321.3	Test, debug, and deploy web pages containing PHP and MySQL.	2	3	3										2	3	

S. No.	Enrollment.No.	Student's Name	**BSC321** OPEN SOURCE TECHNOLOGIES (PHP, MYSQL) LAB Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U9G9
1	A60204922004	Mr ARNAV SHRIVASTAV	100	30	70	A+	10	1	1	10
2	A60204922005	Ms ASTHA PATEL	100	30	70	A	9	1	1	9
3	A60204922010	Mr PIYUSH TRIPATHI	100	30	70	DE	0	1	0	0
4	A60204922008	Mr ABHAY KUMAR PRASAD	100	30	70	A	9	1	1	9
5	A60204922009	Ms RIYA CHOUDHARY	100	30	70	A	9	1	1	9
6	A60204							1	1	10

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Average Grade Point = 47 /6 (Total Grade point/Total no of students) = 7.83
No of students getting greater than average (7.83) marks = 5 students = 83.33%

Total No. of Students	=	6
Level 2	> 60% Average marks	83.33%
Attainment Level		Level 3

Level 1	< 50% Average marks
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average marks

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AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Handout
Course : System Analysis and Design
Course Code :BSC 401, Crédits : 03, Session : 2023-24 (Even Sem.), Class : BSc. IT 2nd Year
Faculty Name : Dr. Jhankar Moolchandani

Course Objective:

The course has been designed to provide a solid foundation of systems principles and an understanding of how business function, while heightening students to the issues analysts face daily.

Course outcomes: After completion of course, the student will be able to:

CO-1	Gather data to analyse and specify the requirements of a system.
CO-2	Design system components and environments.
CO-3	Build general and detailed models that assist programmers in implementing a system.
CO-4	Design a database for storing data, a user interface for data input and output, and controls to protect t systemand its data

Teaching Pedagogy:

T1	Activity based learning through lab experiments like Dissection, specimen observation Power Point Presentations and white board teaching
T2	Class/Seminars Quiz/ Assignments

Assessment Tools

AT1-1	Quiz
AT1-2	Activity Based Learning
AT1-3	Midterm Exams
AT1-4	Flip Class/Group Discussion
AT1-5	
AT1-6	

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AT1-7	Poster
AT1-8	Oral *viva-voce* examination
AT1-9	Charts/Model/Specimen observation

Prerequisites	Module wise contents details	Assessment tools
Course Contents	**Module I : Introduction(5 Hours)** System definition and concepts, Characteristics and types of system, Manual and automated systems, Real-life Business sub-systems: Production, Marketing, Personal, Material, Finance. Systems models types of models: Systems environment and boundaries, Real-time and distributed systems, Basic principles of successful systems.	Mid Term-1, Quiz & End Sem Exam
	Module II: Systems analyst (3 Hours) Role and need of systems analyst, Qualifications and responsibilities, Systems Analyst as and agent of change.	Mid Term-1, Quiz & End Sem Exam
	Module III: System Development cycle (5 Hours) Introduction to systems development life cycle (SDLC): Various phases of development: Analysis, Design, Development, Implementation, Maintenance, Systems documentation considerations: Principles of systems documentation, Types of documentation and their importance, Enforcing documentation discipline in an organization.	Assignment, Quiz & End Sem Exam
	Module IV: System Planning (6 Hours) Data and fact gathering techniques: Interviews, Group communication, Presentations, Site visits. Feasibility study and its importance, Types of feasibility reports, System Selection plan and proposal, Prototyping, Cost- Benefit and analysis: Tools and techniques.	Assignment, Quiz & End Sem Exam
	Module V: Systems Design and Modeling (6 Hours) Process modeling, Logical and physical design, Design representation, Systems flowcharts and structured charts, Data flow diagrams, Common diagramming conventions and guidelines using DFD and ERD diagrams. Data Modeling and systems analysis, System Audit and Security.	Assignment, Quiz & End Sem Exam
	Module VI: Introduction to software projects (5 Hours) Software life cycle models: Waterfall, Prototype, Evolutionary and	Assignment, Quiz & End Sem Exam

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Additional Learning:

List of Assignments	1. Understanding system and its concepts 2. Explain the characteristics of systems. 3. Understanding different types of systems. 4. What are different types of real time systems> 5. Understanding distributed systems and its advantages and applications. 6. Role of the system analyst. 7. Primary sources of data collection. 8. Qualifications and responsibilities of system analyst. 9. Different phases of software development life cycle. 10. Role of SRS. 11. Feasibility study and its importance. 12. Prototyping and its advantages. 13. Cost Benefit Analysis tools and techniques 14. Process modelling 15. Process design models
Suggested reading:	**Text** • System Analysis and Design Elias M. Award, Galgotia Publication **References** • System Analysis and Design Methods, Whitten, Bentaly and Barlow, Galgotia Publication. • Modern System Analysis and Design, Jeffrey A. Hofer Joey F. George Joseph S. Va lacich Addison Weseley

Assessment Plan:

Component of Evaluation	Description	Code	Weightage %
Continuo Evaluatic	Mid T	CT	15%

	Viva-Voce/Quiz	V/Q	10%
Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking the End Semester examination. The dispensation of 25% includes all types of leaves. including medical leaves.	A	5%
End Semester Examination	End Semester Examination	ESE	60%
Total			**100%**

Abbreviations: CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, ESE: End Semester Examination; A: Attendance

Course Articulation Matrix (Mapping of COs with POs)

Course Outcomes	Correlation with POs												Correlation with PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	1				2	1			3	3	
CO2	3	2	3	2	1				2	1			3	2	1
CO3	3	2	2	2	1				2	1			3	2	1
CO4	3	3	2	2	1				2	1			3	2	1

Brief Lecture Plan

Module I

Lecture No.	Date of Lecture	Topic	Subtopic (if any)`-	Plan Type (L/T/P)	Assessment Tool
1	10/01/2024	System definition andconcepts	System definition andconcept,Basic principles of successful systems.	L/T	Mid Term, Quiz & End Sem Exam
2	12/01/2024		Characteristics andtypes of	L/T	Mid Term Exam

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3	**13/01/24**	Real-life Business sub-systems:	Production, Marketing	**L/T**	Mid Term, Quiz & End Sem Exam
4	**15/01/24**	Real-life Business sub-systems:	Personal, Material,	**L/T**	Mid Term, Quiz & End Sem Exam
5	**19/01/24**	Real-life Business sub-systems	Finance. Systems models	**L/T**	Mid Term, Quiz &
					End Sem Exam
6	**24/01/24**	types of models:	types of models:	**L/T**	Mid Term, Quiz & End Sem Exam
7	**29/01/24**	Systems environment and boundaries	Systems environment and boundaries	**L/T**	Mid Term, Quiz & End Sem Exam
8	**31/01/24**	Real-time and distributed systems	Real-time and distributed systems	**L/T**	Mid Term, Quiz & End Sem Exam
9	**02/02/24**	Manual and automated systems	Manual and automated systems	**L/T**	Mid Term, Quiz & End Sem Exam
10	**05/02/24**	Basic principles of successful systems.	Basic principles of successful systems.	**L/T**	Mid Term, Quiz & End Sem Exam

Module II

Lecture No.	**Date of**	**Topic**	**Subtopic**	**Plan**	**Assessmen**

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11	**07/02/24**	**System Ananlyst**	Role and need ofsystems analyst,	**L/T**	Mid Term, Quiz & End Sem Exam
12	**09/02/24**		Qualifications and responsibilities	**L/T**	Mid Term, Quiz & End Sem Exam
13	**12/02/24**		Systems Analyst as and agent of change.	**L/T**	Mid Term, Quiz & End Sem Exam

Module III

Lecture No.	Date of Lecture	Topic	Subtopic	Plan Type (L/T/P)	Assessment Tool
13	**23/02/24**	Introduction tosystems development life cycle	Introduction t o systems development life cycle (SDLC):,	**L/T**	Mid Term, Quiz & End Sem Exam
		(SDLC):			
14	**26/02/24**	Various phases of development:	Analysis,	**L/T**	Mid Term, Quiz & End Sem Exam
15	**28/02/24**		Design, Development	**L/T**	Mid Term, Quiz & End Sem Exam
16	**01/03/24**		Implementation ,Maintenance,	**L/T**	Mid Term, Quiz & End Sem Exam
17	**04/03/24**	Systems documentation considerations	Principles of systems documentation,	**L/T**	Mid Term, Quiz & End

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18	**06/03/24**		Types of documentation andtheir importance,	**L/T**	Mid Term, Quiz & End Sem Exam
19	**18/03/24**		Enforcing documentatio ndiscipline in an organization.	**L/T**	Mid Term, Quiz & End Sem Exam Mid Term, Quiz& End

Module IV

Lecture No.	**Date of Lecture**	**Topic**	**Subtopic**	**Plan Type (L/T/P)**	**AssessmentTool**
20	**20/03/24**	Data and fact gathering techniques:	Interviews,	**L/T**	Mid Term, Quiz & End Sem Exam Mid Term, Quiz& End
21	**22/03/24**		Group communication ,	**L/T**	Mid Term, Quiz & End Sem Exam Mid Term, Quiz & End
22	**27/03/24**		Presentations,	**L/T**	Mid Term, Quiz & End Sem Exam Mid

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					Term, Quiz & End
23	**01/04/24**		Site visits.	**L/T**	Mid Term, Quiz & End Sem Exam Mid Term, Quiz& End
24	**03/04/24**	Feasibility study and its importance	Feasibility study andits importance	**L/T**	Mid Term, Quiz & End Sem Exam Mid Term, Quiz & End
25	**05/04/24**	Types of feasibility reports	Types of feasibilityreports	**L/T**	Mid Term, Quiz & End Sem Exam Mid Term, Quiz & End
26	**08/04/24**	System Selection planand proposal,	System Selection planand proposal,	**L/T**	Mid Term, Quiz & End Sem Exam Mid Term, Quiz & End
27	**10/04/24**		Prototyping,	**L/T**	Mid Term, Quiz & End Sem Exam Mid Term, Quiz& End
28	**12/04/24**	Cost-Benefit and analysis:	Tools	**L/T**	Mid Term, Quiz & End Sem Exam Mid Term, Quiz& End
29	**15/04/24**		techniques.	**L/T**	Mid Term, Quiz & End Sem Exam Mid Term,

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Lecture No.	Date of Lecture	Topic	Subtopic	Plan Type (L/T/P)	Assessment Tool
30	20/04/24	Process modeling	Process modeling,	L/T	Mid Term, Quiz & End Sem Exam Mid Term, Quiz & End
31	22/04/24	Logical and physical design,	Logical and physicaldesign,	L/T	Mid Term, Quiz & End Sem Exam Mid Term, Quiz& End
32	24/04/24	Design representation,Systems	flowcharts	L/T	Mid Term, Quiz & End Sem Exam Mid Term, Quiz & End
33	25/04/24		structured charts,	L/T	Mid Term, Quiz & End Sem Exam Mid Term, Quiz& End
34	26/04/24		Data flow diagrams,Common	L/T	Mid Term, Quiz & End Sem Exam Mid Term, Quiz& End
35	26/04/24	diagramming conventions and guidelines	diagramming conventions and guidelines using DFD and ERD diagrams	L/T	Mid Term, Quiz & End Sem Exam Mid Term, Quiz& End
36	26/04/24	Data Modeling and systems analysis,	Data Modeling and systems analysis,	L/T	Mid Term, Quiz & End Sem Exam Mid

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37	**28/04/24**	System Audit and Security.	System Audit andSecurity.	**L/T**	Mid Term, Quiz &

ResultAttainment

S. No.	Enrollment.No.	Student's Name	**BSC401** SYSTEM ANALYSIS AND DESIGN							
			Max Marks	CE Weight Age (%)	ET Weight Age (%)	GO	GP	ACU	ECU	U4G4
1	A602049220004	Mr ARNAV SHRIVASTAV	100	30	70	C+	4	3	3	12
2	A602049220005	Ms ASTHA PATEL	100	30	70	A-	8	3	3	24
3	A602049220007	Ms SAKSHI SURYAVANSHI	100	30	70	A	9	3	3	27
4	A602049220008	Mr ABHAY KUMAR PRASAD	100	30	70	B-	5	3	3	15
5	A602049220009	Ms RIYA CHOUDHARY	100	30	70	B+	7	3	3	21
6	A602049220100	Mr PIYUSH TRIPATHI	100	30	70	DE	0	3	0	0

Average Grade Point = 33/6 (Total Grade point/Total no of students) = 5.41
No of students getting greater than average (5.41) marks = 3 students =83%

Total No. of Students		6
Level 1	50% average marks	83%
Attainment Level		Level 3

Note: Attainment Level

Level 1	50% average marks and
Level 2	>50% average marks and < 60% average marks
Level 3	> 60% Average mark

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