AMITY UNIVERSITY
RAJASTHAN

AMITY SCHOOL OF ENGINEERING & TECHNOLOGY (ASET)

Bachelor of Technology (Chemical Engineering)

Programme Code: BTH

Duration – 4 Years Full Time

Programme Structure

And

Curriculum & Scheme of Examination

(2020-2024)

AMITY UNIVERSITY
RAJASTHAN

PREAMBLE

Amity University aims to achieve academic excellence by providing multi-faceted education to students and encourage them to reach the pinnacle of success. The University has designed a system that would provide rigorous academic programme with necessary skills to enable them to excel in their careers.

This booklet contains the Programme Structure, the Detailed Curriculum and the Scheme of Examination. The Programme Structure includes the courses (Core and Elective), arranged semester wise. The importance of each course is defined in terms of credits attached to it. The credit units attached to each course has been further defined in terms of contact hours i.e. Lecture Hours (L), Tutorial Hours (T), Practical Hours (P). Towards earning credits in terms of contact hours, 1 Lecture and 1 Tutorial per week are rated as 1 credit each and 2 Practical hours per week are rated as 1 credit. Thus, for example, an L-T-P structure of 3-0-0 will have 3 credits, 3-1-0 will have 4 credits, and 3-1-2 will have 5 credits.

The Curriculum and Scheme of Examination of each course includes the course objectives, course contents, scheme of examination and the list of text and references. The scheme of examination defines the various components of evaluation and the weightage attached to each component. The different codes used for the components of evaluation and the weightage attached to them are:

Components	Codes	Weightage (%)
Case Discussion/ Presentation/ Analysis	C	05 - 10
Home Assignment	H	05 - 10
Project	P	05 - 10
Seminar	S	05 - 10
Viva	V	05 - 10
Quiz	Q	05 - 10
Class Test	CT	10 - 15
Attendance	A	05
End Semester Examination	EE	50

It is hoped that it will help the students study in a planned and a structured manner and promote effective learning. Wishing you an intellectually stimulating stay at Amity University.

Program Learning Outcomes – PLO

- Graduates are able to apply the technical knowledge and skills required to solve real-world chemical engineering problems within their organizations.
- To enable graduates to undertake design development, production, managerial activities in the areas of chemical engineering.
- Excel in careers in the chemical, petroleum, petrochemical, pharmaceutical, food, energy, materials processing or other related industries/organizations.
- Pursue advanced degrees for a career in engineering, academia, business, or research and development.
- Demonstrate high-level of professionalism, ethical and social responsibility, independent learning, and desire for life-long learning.

Credits Summary

B.Tech Chemical Engineering (04 Years/ 08 Semesters)						
Semester	**Core Course (CC)**	**Domain Electives (DE)**	**Value Added Course (VAC)**	**Open Electives (OE)**	**Non-Teaching Credit Courses (NTCC)**	**Total**
I	24	-	4	-	2	**30**
II	19	-	8	3	2	**32**
III	16	4	4	3	-	**27**
IV	13	4	4	3	-	**24**
V	21	3	4	3	3	**34**
VI	21	3	4	3	-	**31**
VII	14	-	4	3	6	**27**
VIII	10	-	-	-	12	**22**
Total	**138**	**14**	**32**	**18**	**25**	**227**

CC = Core Course

DE = Domain Elective

OE = Open Elective

VA = Value Added Course

NTCC = Non – Teaching Credit Courses (NTCC)

AMITY SCHOOL OF ENGINEERING & TECHNOLOGY (ASET)

Program Name: B.Tech – Chemical Engineering

FIRST SEMESTER

Course Code	Course Title	Category	Lecture (L) Hours Per week	Tutorial (T) Hours Per week	Practical (P) Hours Per week	Total Credits
Core Courses						
AM-101	Applied Mathematics – I	CC	3	1	-	4
AP-102	Applied Physics – I – Fields & Waves	CC	2	1	-	3
AC- 103	Applied Chemistry	CC	2	1	-	3
BME-104	Element of Mechanical Engineering	CC	2	1	-	3
BCS- 105	Introduction to Computers & Programming in C	CC	2	1	-	3
BEE-106	Basic Electrical Engineering	CC	2	1	-	3
AP-122	Applied Physics – I – Fields & Waves	CC			2	1
AC-123	Applied Chemistry Lab	CC			2	1
BME- 124	Element of Mechanical Engineering Lab	CC			2	1
BCS- 125	Programming in C Lab	CC			2	1
BEE-126	Basic Electrical Engineering Lab	CC			2	1
Value Added Courses						
BCS 101	English	VA	1	-	-	1
BSS 104	Behavioral Science-I Understanding Self For Effectiveness- I	VA	1	-	-	1
FLT 101 FLG 101 FLS 101 FLC 101	Foreign Language – I French German Spanish Chinese	VA	2	-	-	2
Non-Teaching Credit Course (NTCC)						
AND001	Anandam-I	NTCC	-	-	-	2
	TOTAL					**30**

AMITY SCHOOL OF ENGINEERING & TECHNOLOGY (ASET)

Program Name: B.Tech –Chemical Engineering

SECOND SEMESTER

Course Code	Course Title	Category	Lecture (L) Hours Per week	Tutorial (T) Hours Per week	Practical (P) Hours Per week	Total Credits
Core Courses						
AM- 201	Applied Mathematics – II	CC	3	1	-	4
AP-202	Applied Physics – II – Modern Physics	CC	2	1	-	3
BCS- 203	Object Oriented Programming in C^{++}	CC	2	1	-	3
BME-204	Engineering Mechanics	CC	2	1	-	3
BME-205	Engineering Graphics	CC	1	-	-	1
BME 206	Domain Workshop	CC	1	-	-	1
AP- 222	Applied Physics – II – Modern Physics	CC	-	-	2	1
BCS- 223	Object Oriented Programming in C^{++} Lab	CC	-	-	2	1
BME-224	Engineering Mechanics Lab	CC	-	-	2	1
BME-225	Engineering Graphics Lab	CC	-	-	2	1
	Open Elective-1	OE	3	-	-	3
Value Added Courses						
BCS 201	English	VA	1	-	-	1
BSS 204	Behavioral Science – II Problem Solving & Creative Thinking	VA	1	-	-	1
FLT 201 FLG 201 FLS 201 FLC 201	Foreign Language – II French German Spanish Chinese	VA	2	-	-	2
EVS-001	**Environmental Studies**	VA	4			4
Non-Teaching Credit Course (NTCC)						
AND002	Anandam-II	NTCC	-	-	2	2
	TOTAL					**32**

AMITY SCHOOL OF ENGINEERING & TECHNOLOGY (ASET)

Program Name: B.Tech –Chemical Engineering

THIRD SEMESTER

Course Code	Course Title	Category	Lecture (L) Hours Per week	Tutorial (T) Hours Per week	Practical (P) Hours Per week	Total Credits
Core Courses						
AM- 301	Applied Mathematics – III	CC	3	1	-	4
BTH- 302	Fluid and Particle Mechanics	CC	3	1	-	4
BTH- 303	Chemical Process Calculations	CC	3	1	-	4
BTH-304	Chemical Technology-I	CC	2	1	-	3
BTH- 322	Fluid Mechanics Lab	CC	-	-	2	1
Domain Elective-I : Choose any one from the following courses						
BTH- 305	Material Science	DE	3	1	-	4
BTH-306	Polymer Technology	DE	3	1	-	4
	Open Elective –II	OE				3
Value Added Course						
BCS 301	Communication Skills – I	VA	1	-	-	1
BSS 304	Behavioral Science-III (Interpersonal Communication)	VA	1	-	-	1
FLT 301 FLG 301 FLS 301 FLC 301	Foreign Language – III French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**27**

AMITY SCHOOL OF ENGINEERING & TECHNOLOGY (ASET)

Program Name: B.Tech –Chemical Engineering

FOURTH SEMESTER

Course Code	Course Title	Category	Lecture (L) Hours Per week	Tutorial (T) Hours Per	Practical (P) Hours Per week	Total Credits
Core Courses						
BTH-401	Chemical Technology-II	CC	2	1	-	3
BTH-402	Chemical Engineering Thermodynamics-I	CC	3	1	-	4
BTH- 403	Mechanical Operations	CC	3	1	-	4
BTH- 421	Chemical Technology Lab	CC	-	-	2	1
BTH- 423	Mechanical Operation Lab	CC	-	-	2	1
Domain Elective-II : Choose any one from the following courses						
BTH- 404	Numerical Analysis	DE	2	1	-	3
BTH- 424	Numerical Analysis Lab (DE-II)	DE	-	-	2	1
BTH- 405	Corrosion Science and Engg.	DE	3	1	-	4
	Open Elective –III	OE				**3**
Value AddedCourses						
BCS 401	Communication Skills - II	VA	1	-	-	1
BSS 404	Behavioral Science – IV, Relationship Management	VA	1	-	-	1
FLT 401 FLG 401 FLS 401 FLC 401	Foreign Language – IV French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**24**

Note: -Industrial Training completed during summer vacations and will be evaluated in fifth Semester.

AMITY SCHOOL OF ENGINEERING & TECHNOLOGY (ASET)

Program Name: B.Tech –Chemical Engineering

FIFTH SEMESTER

Course Code	Course Title	Category	Lecture (L) Hours Per week	Tutorial (T) Hours Per week	Practical (P) Hours Per week	Total Credits
Core Courses						
BTH- 501	Chemical Reaction Engineering –I	CC	3	1	-	4
BTH- 502	Chemical Engineering Thermodynamics-II	CC	3	1	-	4
BTH-503	Heat Transfer	CC	3	1	-	4
BTH- 504	Mass Transfer-I	CC	3	1	-	4
BTH- 521	Chemical Reaction Engineering Lab	CC			2	1
BTH- 523	Heat Transfer Lab	CC			2	1
BCS-510	Web Development	CC	2	-	-	2
BCS-530	Web Development Lab	CC	-	-	2	1
Domain Elective-III : Choose any one from the following courses						
BTH- 505	Process Instrumentation	DE	3	-	-	3
BTH- 506	Piping Design	DE	3	-	-	3
	Open Elective -IV	OE				**3**
Non-Teaching Credit Course (NTCC)						
BTH- 550	Practical Training Evaluation	NTCC	-	-	-	3
Value Added Courses						
BCS 501	Communication Skills – III	VA	1	-	-	1
BSS 504	Behavioral Science –V Group Dynamics & Team Building	VA	1	-	-	1
FLT 501 FLG 501 FLS 501 FLC 501	Foreign Language – V French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**34**

AMITY SCHOOL OF ENGINEERING & TECHNOLOGY (ASET)

Program Name: B.Tech –Chemical Engineering

SIXTH SEMESTER

Course Code	Course Title	Category	Lecture (L) Hours Per week	Tutorial (T) Hours Per week	Practical (P) Hours Per week	Total Credits
Core Courses						
BTH- 601	Process Dynamics and Control	CC	3	1	-	3
BTH- 602	Chemical Reaction Engineering-II	CC	3	1	-	3
BTH- 603	Mass Transfer-II	CC	3	1	-	4
BTH- 604	Equipment Design	CC	3	1	-	3
BTH- 605	Environmental Pollution and Control	CC	2		-	2
BTH- 621	Process Dynamics and Control Lab	CC			2	1
BTH- 623	Mass Transfer Lab	CC			2	1
BTH- 625	Environmental Pollution and Control Lab	CC			2	1
BCS-610	Programming with Python	CC	2	-	-	2
BCS-630	Programming with Python Lab	CC	-	-	2	1
Domain Elective-IV : Choose any one from the following courses						
BTH- 606	Energy Management	DE	3	--	--	3
BTH-607	Energy Resources &Utilization	DE	3	-	-	3
	Open Elective –V	OE				3
Value Added Courses						
BCS 601	Communication Skills – IV	VA	1	-	-	1
BSS 604	Behavioral Science – VI, Stress & Coping Strategies	VA	1	-	-	1
FLT 601 FLG 601 FLS 601 FLC 601	Foreign Language – VI French German Spanish Chinese	VA	2	-	-	2
	TOTAL	OE				**31**

Note: -Industrial Training completed during summer vacations and will be evaluated in seventh Semester.

AMITY SCHOOL OF ENGINEERING & TECHNOLOGY (ASET)

Program Name: B.Tech –Chemical Engineering

SEVENTH SEMESTER

Course Code	Course Title	Category	Lecture (L) Hours Per week	Tutorial (T) Hours Per week	Practical (P) Hours Per week	Total Credits
Core Courses						
BTH- 701	Modeling & Simulation	CC	3	1		4
BTH - 702	Petroleum Refining	CC	2	1	-	3
BTH- 703	Transport Phenomena	CC	3	1	-	4
BCS-710	Advanced Programming with Python	CC	2	-	-	2
BCS-730	Advanced Programming with Python Lab	CC	-	-	2	1
	Open Elective –VI	OE	-	-	-	3
Non-Teaching credit course (NTCC)						
BTH-750	Industrial Training Evaluation	NTCC	-	-	-	3
BTH-760	Seminar	NTCC	-	-	-	3
Value Added Courses						
BCS 701	Communication Skills – V	VA	1	-	-	1
BSS 704	Behavioral Science – VII, Individual Society & Nation	VA	1	-	-	1
FLT 701 FLG 701 FLS 701 FLC 701	Foreign Language – VII French German Spanish Chinese	VA	2	-	-	2
	TOTAL					**27**

AMITY SCHOOL OF ENGINEERING & TECHNOLOGY (ASET)

Program Name: B.Tech –Chemical Engineering

EIGHT SEMESTER

Course Code	Course Title	Category	Lecture (L) Hours Per week	Tutorial (T) Hours Per week	Practical (P) Hours Per week	Total Credits
Core Courses						
BTH- 801	Plant Design & Economics	CC	3	1	-	4
BTH- 802	Safety and Hazard Analysis	CC	2	1		3
BTH- 803	New Separation Processes	CC	2	1		3
BTH- 860	Project	NTCC	-	-	-	12
	TOTAL					**22**

Total Credits (30+32+27+24+34+31+27+22) = 227

Curriculum & Scheme of Examination

APPLIED MATHEMATICS – I

Course Code: AM 101 **Credit Units: 04**

Course Objective:

The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Contents:

Module I: Differential Calculus

Successive differentiation, Leibnitz's theorem (without proof), Mean value theorem, Taylor's theorem (proof), Remainder terms, Asymptote & Curvature, Partial derivatives, Chain rule, Differentiation of Implicit functions, Exact differentials, Tangents and Normals, Maxima, Approximations, Differentiation under integral sign, Jacobians and transformations of coordinates.

Module II: Integral Calculus

Fundamental theorems, Reduction formulae, Properties of definite integrals, Applications to length, area, volume, surface of revolution, improper integrals, Multiple Integrals-Double integrals, Applications to areas, volumes.

Module III: Ordinary Differential Equations

Formation of ODEs, Definition of order, degree & solutions, ODE of first order : Method of separation of variables, homogeneous and non homogeneous equations, Exactness & integrating factors, Linear equations & Bernoulli equations, General linear ODE of n^{th} order, Solution of homogeneous equations, Operator method, Method of undetermined coefficients, Solution of simple simultaneous ODE.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text & References:

Text:

- Differential Calculus by Shanti Narain
- Integral Calculus by Shanti Narain

References:

- Differential Equation by A.R. Forsyth
- Higher Engineering Mathematics by H.K. Dass

APPLIED PHYSICS - I - FIELDS AND WAVES

Course Code: AP 102 **Credit Units: 03**

Course Objective:

Aim of this course is to introduce the students to fundamentals of graduate level physics, which form the basis of all applied science and engineering

Course Contents:

Module I: Oscillations & Waves

Oscillations: Introduction to S.H.M. Damped Oscillations: Differential Equation and its solution, logarithmic decrement, Quality Factor, Different conditions of damping of harmonic oscillations. Forced oscillations: Amplitude and Frequency Response, Resonance, Sharpness of Resonance

Plane Progressive Waves: Differential Equation and Solution, Superposition of Progressive Waves stationary waves.

Ultrasonics: Generation and application of ultrasonicwaves.

Module II: Wave Nature of Light

Interference: Coherent Sources, Conditions of interference, Interference due to division of wavefront, Fresnels biprism Interference due to division of amplitude, Newton's rings, Interference due to thin films, .

Diffraction: Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a single slit, double slit, N Slits, Transmission grating, Rayleigh criterion and Resolving power of grating.

Polarization: Birefringence, Nicol prism, Production and analysis of plane, circularly and elliptically polarized light, Half and quarter wave plates, Optical rotation, Polarimeter.

Module III: Electromagnetics

Scalar and vector fields, gradient of a scalar field, physical significance of gradient, equipotential surface. Line, surface and volume integrals, Divergence and curl of vector field and mathematical analysis physical significance, Electric flux, Gauss' law, Proof and Applications, Gauss divergence and Stokes theorems.

Differential form of Gauss' Law, Amperes' Law, Displacement current, Faradays Law, Maxwell equations in free space & isotropic media (Integral form & differential form), EM wave propagation in free space, Poynting vector.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text & References:

- Waves & oscillation, A. P. French
- Physics of waves, W. C. Elmore & M. A. Heald
- Introduction to Electrodynamics, D. J. Griffith
- Electrodynamics, Gupta, Kumar & Singh
- Optics, A. K. Ghatak
- Engineering Physics, Satya Prakash

APPLIED CHEMISTRY

Course Code: AC 103 **Credit Units: 03**

Course Objective:

Four basic sciences, Physics, Chemistry, Mathematics and Biology are the building blocks in engineering and technology. Chemistry is essential to develop analytical capabilities of students, so that they can characterize, transform and use materials in engineering and apply knowledge in their field. All engineering fields have unique bonds with chemistry whether it is Aerospace, Mechanical, Environmental and other fields the makeup of substances is always a key factor, which must be known. For electronics and computer science engineering, apart from the material, computer modeling and simulation knowledge can be inherited from the molecule designing. The upcoming field of technology like Nanotechnology and Biotechnology depends fully on the knowledge of basic chemistry. With this versatile need in view, course has been designed in such a way so that the student should get an overview of the whole subject.

Course Contents:

Module I: Water Technology
Introduction and specifications of water, Hardness and its determination (EDTA method only), Alkalinity, Boiler feed water, boiler problems – scale, sludge, priming & foaming: causes & prevention, Boiler problems – caustic embitterment & corrosion: causes & prevention, Carbonate & phosphate conditioning, colloidal conditioning & calgon treatment Water softening processes: Lime – soda process, Ion exchange method, Water for domestic use.

Module II: Fuels
Classification, calorific value of fuel, (gross and net), Determination of calorific value of fuels, bomb calorimeter, Solid fuels - Proximate and ultimate analysis, Octane & Cetane No. and its significance. Numericals on combustion

Module III: Instrumental Methods of analysis
Introduction; Principles of spectroscopy; Laws of absorbance IR : Principle, Instrumentation, Application UV : Principle, Instrumentation, Application, NMR : Principle, Instrumentation, Application

Module III: Lubricants
Introduction; Mechanism of Lubrication; Types of Lubricants; Chemical structure related to Lubrication; Properties of lubricants; Viscosity and Viscosity Index; Iodine Value; Aniline Point; Emulsion number; Flash Point; Fire Point; Drop Point; Cloud Point; Pour Point. Selection of Lubricants.

Module VI: Corrosion
Introduction, Mechanism of dry and wet corrosion, Types of corrosion-Galvanic, Concentration cell, soil, pitting, intergranular, waterline. Passivity. Factors influencing corrosion. Corrosion control.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text & References:

Text:
- Engineering Chemistry- Jain and Jain
- Engineering Chemistry - Sunita Rattan
- Engineering Chemistry - Shashi Chawla

References:
- Engineering Chemistry – Dara and Dara
- Spectroscopy- Y.R Sharma
- Corrosion Engineering – Fontenna and Greene

ELEMENT OF MECHANICAL ENGINEERING

Course Code: BME 104 **Credit Units: 03**

Course Objective:

The objective of this course is to impart the basic knowledge of thermodynamics, stress- strain, materials & their properties and various manufacturing processes to the students of all engineering discipline.

Course Contents:

Module I: Fundamental Concepts

Definition of thermodynamics, system, surrounding and universe, phase, concept of continuum, macroscopic & microscopic point of view, Thermodynamic equilibrium, property, state, path, process, cyclic process, Zeroth, first and second law of thermodynamics, Carnot Cycle, Introduction to I.C. Engines-two &four stoke S.I. and C.I. engines. Otto cycle. Diesel cycle.

Module II: Stress And Strain Analysis

Simple stress and strain: introduction, normal shear, and stresses-strain diagrams for ductile and brittle materials. Elastic constants, one-dimensional loadings of members of varying cross-section, Strain Energy, Properties of material-strength, elasticity, stiffness, malleability, ductility, brittleness, hardness and plasticity etc; Concept of stress and strain stress strain diagram, tensile test, impact test and hardness test.

Module III: Casting & Forging

Introduction of casting, pattern, mould making procedures, sand mould casting, casting defects, allowances of pattern. Forging-introduction, upsetting & drawing out, drop forging, press forging & m/c forging

Module IV: Welding & Sheet metal working

Introduction of welding processes, classification, gas welding, arc welding, resistance welding. Introduction to sheet metal shop, Shearing, trimming, blanking, piercing, shaving, notching, stretch forming, nibbling coining, embossing and drawing.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text & References:

- Engineering thermodynamics, by P.K. Nag, Tata McGraw Hill.
- Thermal Engineering, by D.S. Kumar. S.K. Kataria and Sons.
- Thermal Engineering by PL Ballaney; Khanna Publishers, Delhi.
- Engineering Thermodynamics: Work and Heat Transfer, by Rogers and Mayhew, ELBS Publications
- Heine, R.W. C.R. Loper and P.C. Rosenthal, Principles of metal casting McGraw Hill
- Welding Technology by R.S. Parmar, Khanna Publishers.
- Thermodynamics and Heat Engines Volume-I, by R. Yadav: Central Publications.
- Ganesan, V. Internal Combustion Engine, Tata McGraw-Hill.
- Mathur, M.L. and Sharma, R.P. Internal Combustion Engine. Dhanpat Rai Publication

INTRODUCTION TO COMPUTERS AND PROGRAMMING IN C

Course Code: BCS 105 Credit Units: 03

Course Objective:

The objective of this course module is to acquaint the students with the basics of computers system, its components, data representation inside computer and to get them familiar with various important features of procedure oriented programming language i.e. C.

Course Contents:

Module I: Introduction
Introduction to computer, history, von-Neumann architecture, memory system (hierarchy, characteristics and types), H/W concepts (I/O Devices), S/W concepts (System S/W & Application S/W, utilities). Data Representation: Number systems, character representation codes, Binary ,octal, hexadecimal and their interconversions. Binary arithmetic, floating point arithmetic, signed and unsigned numbers, Memory storage unit.

Module II: Programming in C
History of C, Introduction of C, 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.

Module III: Fundamental Features in C
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 IV: 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.

Module V: Advanced features in C
Pointers, relationship between arrays and pointers Argument passing using pointers, Array of pointers. Passing arrays as arguments.
Strings and C string library.
Structure and Union. Defining C structures, Giving values to members, Array of structure, Nested structure, passing strings as arguments.
File Handling.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text & References:

Text:

- "ANSI C" by E Balagurusamy
- Yashwant Kanetkar, "Let us C", BPB Publications, 2nd Edition, 2001.
- Herbert Schildt, "C:The complete reference", Osbourne Mcgraw Hill, 4th Edition, 2002.
- V. Raja Raman, "Computer Programming in C", Prentice Hall of India, 1995.

References*:*

- ***Kernighan & Ritchie, "C Programming Language", The (Ansi C Version), PHI, 2nd Edition.***
- ***J. B Dixit, "Fundamentals of Computers and Programming in 'C'.***
- P.K. Sinha and Priti Sinha, "Computer Fundamentals", BPB publication.

BASIC ELECTRICAL ENGINEERING

Course Code: BEE 106 **Credit Units: 03**

Course Objective:

The objective of the course is to provide a brief knowledge of Electrical Engineering to students of all disciplines. This Course includes some theorems related to electrical, some law's related to flow of current, voltages, basic knowledge of Transformer, basic knowledge of electromagnetism, basic knowledge of electrical network.

Course Contents:

Module I: Basic Electrical Quantities

Basic Electrical definitions-Energy, Power, Charge, Current, Voltage, Electric Field Strength, Magnetic Flux Density, etc., Resistance, Inductance and Capacitance. Ideal Source, Independent Source and Controlled Source

Module II: Network Analysis Techniques & Theorems

Circuit Principles: Ohm's Law, Kirchoff's Current Law, Kirchoff's Voltage Law Network Reduction: Star–Delta Transformation, Source Transformation, Nodal Analysis, Loop analysis. Superposition theorem Thevenin's Theorem, Norton's theorem and Reciprocity theorem.

Module III: Alternating Current Circuits

Peak, Average and RMS values for alternating currents, Power calculation:
reactive power, active power, Complex power, power factor, impedance, reactance, conductance, susceptance Resonance: series Resonance, parallel resonance, basic definition of Q factor & Band-width.

Module IV: Transformers

Basic Transformer Operation principle, Construction, Voltage relations, Current relations, Linear circuit models, Open circuit test, Short circuit test, Transformer Efficiency.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text & References:

- R.J. Smith, R.C. Dorf: Circuits, devices and Systems
- B.L. Thareja: Electrical Technology : Part -1 & 2
- V. Deltoro: Electrical Engineering fundamentals
- Schaum's Series: Electrical Circuits

APPLIED PHYSICS LAB

Course Code: AP 122 **Credit Units: 01**

List of Experiments:

1. To determine the wavelength of sodium light by Newton's rings method.
2. To determine the dispersive power of the material of prism with the help of a spectrometer.
3. To determine the specific rotation of sugar by Bi-quartz or Laurent half shade polarimeter.
4. To determine the speed of ultrasonic waves in liquid by diffraction method.
5. To determine the width of a narrow slit using diffraction phenomena.
6. To determine the temperature coefficient of platinum wire, using a platinum resistance thermometer and a Callender & Griffth's bridge.
7. To determine the value of specific charge (ratio of e/m) of an electron by Thomson method.
8. To determine the internal resistance of Leclanche cell with the help of Potentiometer.
9. To determine the resistance per unit length of a Carey Foster's bridge wire and also to find out the specific resistance of a given wire.
10. To plot graph showing the variation of magnetic field with distance along the aixs of a circular coil carrying current, and hence estimate the radius of the coil.
11. To determine the value of acceleration due to gravity ('g') in the laboratory using bar pendulum.
12. To determine the moment of inertia of a flywheel about its own axis of rotation.
13. To determine the density of material of the given wire with the help of sonometer.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	15	15	15	25	25

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

APPLIED CHEMISTRY LAB

Course Code: AC 123 **Credit Units: 01**

Course Contents:

LIST OF EXPERIMENTS

(Any 10 Experiments)

1. To determine the ion exchange capacity of a given cation exchanger.

2. To determine the temporary, permanent and total hardness of a sample of water by complexometric titration method.

3. To determine the type and extent of alkalinity of given water sample.

4. To determine the number of water molecules of crystallization in Mohr's salt (ferrous ammonium sulphate) provided standard potassium dichromate solution (0.1N) using diphenylamine as internal indicator.

5. To determine the ferrous content in the supplied sample of iron ore by titrimetric analysis against standard $K_2Cr_2O_7$ solution using potassium ferricyanide $[K_3Fe(CN)_6]$ as external indicator.

6. (a) To determine the surface tension of a given liquid by drop number method.
   (b) To determine the composition of a liquid mixture A and B (acetic acid and water) by surface tension method.

7. To prepare and describe a titration curve for phosphoric acid – sodium hydroxide titration using pH-meter.

8. (a) To find the cell constant of conductivity cell.
   (b) Determine the strength of hydrochloric acid solution by titrating it against standard sodium hydroxide solution conductometrically

9. Determination of Dissolved oxygen in the given water sample.

10. To determine the total residual chlorine in water.

11. Determination of amount of oxalic acid and H_2SO_4 in 1 L of solution using N/10 NaOH and N/10 $KMnO_4$ solution.

12. Determination of viscosity of given oil by means of Redwood viscometer I.

13. To determine flash point and fire point of an oil by Pensky Martin's Apparatus

14. To determine the Iodine value of the oil.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	15	15	15	25	25

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

ELEMENT OF MECHANICAL ENGINEERING LAB

Course Code: BME 124 **Credit Units: 01**

1. Welding

   (a) Arc Welding
   - Butt Joint
   - Lap Joint
   - T Joint

   (b) Gas Welding
   - Butt Joint
   - Lap Joint
   - Brazing of Broken pieces

2. Foundry
   - Sand mould casting by single piece pattern& Split pattern bracket with cores

3. Sheet Metal
   - Dust Bin
   - Mug
   - Funnel
   - Cylindrical Mug with handle-Rectangular

4. Fitting Shop
   - Male – Female Joint
   - Rectangular piece
   - Filing the job

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	15	15	15	25	25

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

PROGRAMMING IN C LAB

Course Code: **BCS 125** **Credit Units: 01**

Software Required: Turbo C

Course Contents:

- C program involving problems like finding the nth value of cosine series, Fibonacci series. Etc.
- C programs including user defined function calls
- C programs involving pointers, and solving various problems with the help of those.
- File handling

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	15	15	15	25	25

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

BASIC ELECTRICAL ENGINEERING LAB

Course Code: BEE 126 **Credit Units: 01**

List of Experiments:

1. To verify KVL & KCL in the given network.
2. To verify Superposition Theorem.
3. To verify Maximum Power Transfer Theorem.
4. To verify Reciprocity Theorem.
5. To determine and verify R_{Th}, V_{Th}, R_N, I_N in a given network.
6. To perform open circuit & short circuit test on a single-phase transformer.
7. To study transient response of a given RLC Circuit.
8. To perform regulation, ratio & polarity test on a single-phase transformer.
9. To measure power & power factor in a three phase circuit by two wattmeter method.
10. To measure power & power factor in a three phase load using three ammeter & three voltmeter method.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	15	15	15	25	25

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

ENGLISH

Course Code: BCS 101 Credit Unit: 01

Course Objective:

The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative & aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond form different perspectives.

Course Contents:

Module I: Vocabulary

Use of Dictionary, Use of Words: Diminutives, Homonyms & Homophones

Module II: Essentials of Grammar - I

Articles**,** Parts of Speech**,** Tenses

Module III: Essentials of Grammar - II

Sentence Structure, Subject -Verb agreement, Punctuation

Module IV: Communication

The process and importance, Principles & benefits of Effective Communication

Module V: Spoken English Communication

Speech Drills , Pronunciation and accent, Stress and Intonation

Module VI: Communication Skills - I

Developing listening skills, Developing speaking skills

Module VII: Communication Skills - II

Developing Reading Skills, Developing writing Skills

Module VIII: Written English communication

Progression of Thought/ideas, Structure of Paragraph, Structure of Essays

Module IX: Short Stories

Of Studies, by Francis Bacon, Dream Children, by Charles Lamb, The Necklace, by Guy de Maupassant
A Shadow, by R.K.Narayan, Glory at Twilight, Bhabani Bhattacharya

Module X: Poems

All the Worlds a Stage	Shakespeare
To Autumn	Keats
O! Captain, My Captain.	Walt Whitman
Where the Mind is Without Fear	Rabindranath Tagore
Psalm of Life	H.W. Longfellow

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

Text & References:

- Madhulika Jha, Echoes, Orient Long Man
- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- Successful Communications, Malra Treece (Allyn and Bacon)
- Effective Technical Communication, M. Ashraf Rizvi.

* 30 hrs Programme to be continued for Full year

BEHAVIOURAL SCIENCE - I
(UNDERSTANDING SELF FOR EFFECTIVENESS)

Course Code: BSS 104 **Credit Units: 01**

Course Objective:

This course aims at imparting:

- Understanding self & process of self exploration
- Learning strategies for development of a healthy self esteem
- Importance of attitudes and its effective on personality
- Building Emotional Competence

Course Contents:

Module I: Self: Core Competency
Understanding of Self
Components of Self – Self identity
Self concept
Self confidence
Self image

Module II: Techniques of Self Awareness
Exploration through Johari Window
Mapping the key characteristics of self
Framing a charter for self
Stages – self awareness, self acceptance and self realization

Module III: Self Esteem & Effectiveness
Meaning and Importance
Components of self esteem
High and low self esteem
Measuring your self esteem

Module IV: Building Positive Attitude
Meaning and nature of attitude
Components and Types of attitude
Importance and relevance of attitude

Module V: Building Emotional Competence
Emotional Intelligence – Meaning, components, Importance and Relevance
Positive and Negative emotions
Healthy and Unhealthy expression of emotions

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:

- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change

- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
- Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

FRENCH - I

Course Code: FLT 101 **Credit Units: 02**

Course Objective:

To familiarize the students with the French language

- with the phonetic system
- with the syntax
- with the manners
- with the cultural aspects

Course Contents:

Module A: pp. 01 to 37: Unités 1, 2, Unité 3 Objectif 1, 2
Only grammar of Unité 3: objectif 3, 4 and 5

Contenu lexical: Unité 1 : Découvrir la langue française : (oral et écrit)

1. se présenter, présenter quelqu'un, faire la connaissance des autres, formules de politesse, rencontres
2. dire/interroger si on comprend
3. Nommer les choses

Unité 2: Faire connaissance

1. donner/demander des informations sur une personne, premiers contacts, exprimer ses goûts et ses préférences
2. Parler de soi: parler du travail, de ses activités, de son pays, de sa ville.

Unité 3: Organiser son temps

1. dire la date et l'heure

Contenu grammatical:

1. organisation générale de la grammaire
2. article indéfini, défini, contracté
3. nom, adjectif, masculin, féminin, singulier et pluriel
4. négation avec « de », "moi aussi", "moi non plus"
5. interrogation : Inversion, est-ce que, qui, que, quoi, qu'est-ce que, où, quand, comment, quel(s), quelle(s)
   Interro-négatif : réponses : oui, si, non
6. pronom tonique/disjoint- pour insister après une préposition
7. futur proche

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- le livre à suivre : Campus: Tome 1

GERMAN - I

Course Code: FLG 101 **Credit Units: 02**

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Course Contents:

Module I: Introduction
Self introduction: heissen, kommen, wohnwn, lernen, arbeiten, trinken, etc.
All personal pronouns in relation to the verbs taught so far.
Greetings: Guten Morgen!, Guten Tag!, Guten Abend!, Gute Nacht!, Danke sehr!, Danke!, Vielen Dank!, (es tut mir Leid!), Hallo, wie geht's?: Danke gut!, sehr gut!, prima!, ausgezeichnet!, Es geht!, nicht so gut!, so la la!, miserabel!

Module II: Interviewspiel
To assimilate the vocabulary learnt so far and to apply the words and phrases in short dialogues in an interview – game for self introduction.

Module III: Phonetics
Sound system of the language with special stress on Dipthongs

Module IV: Countries, nationalities and their languages
To make the students acquainted with the most widely used country names, their nationalitie and the language spoken in that country.

Module V: Articles
The definite and indefinite articles in masculine, feminine and neuter gender. All Vegetables, Fruits, Animals, Furniture, Eatables, modes of Transport

Module VI: Professions
To acquaint the students with professions in both the genders with the help of the verb "sein".

Module VII: Pronouns
Simple possessive pronouns, the use of my, your, etc.
The family members, family Tree with the help of the verb "to have"

Module VIII: Colours
All the color and color related vocabulary – colored, colorful, colorless, pale, light, dark, etc.

Module IX: Numbers and calculations – verb "kosten"
The counting, plural structures and simple calculation like addition, subtraction, multiplication and division to test the knowledge of numbers.
"Wie viel kostet das?"

Module X: Revision list of Question pronouns
W – Questions like who, what, where, when, which, how, how many, how much, etc.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach , Deutsche Sprachlehre für Ausländer
- P.L Aneja , Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH – I

Course Code: FLS 101 **Credit Units: 02**

Course Objective:

To enable students acquire the relevance of the Spanish language in today's global context, how to greet each other. How to present / introduce each other using basic verbs and vocabulary

Course Contents:

Module I
A brief history of Spain, Latin America, the language, the culture…and the relevance of Spanish language in today's global context.
Introduction to alphabets

Module II
Introduction to '*Saludos*' (How to greet each other. How to present / introduce each other).
Goodbyes (despedidas)
The verb *llamarse* and practice of it.

Module III
Concept of Gender and Number
Months of the years, days of the week, seasons. Introduction to numbers 1-100, Colors, Revision of numbers and introduction to ordinal numbers.

Module IV
Introduction to *SER* and *ESTAR* (both of which mean To Be).Revision of '*Saludos*' and '*Llamarse*'. Some adjectives, nationalities, professions, physical/geographical location, the fact that spanish adjectives have to agree with gender and number of their nouns. Exercises highlighting usage of *Ser* and *Estar*.

Module V
Time, demonstrative pronoun (Este/esta, Aquel/aquella etc)

Module VI
Introduction to some key AR /ER/IR ending regular verbs.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras

CHINESE – I

Course Code: FLC 101 Credit Units: 02

Course Objective:

There are many dialects spoken in China, but the language which will help you through wherever you go is Mandarin, or Putonghua, as it is called in Chinese. The most widely spoken forms of Chinese are Mandarin, Cantonese, Gan, Hakka, Min, Wu and Xiang. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I
Show pictures, dialogue and retell.
Getting to know each other.
Practicing chart with Initials and Finals. (CHART – The Chinese Phonetic Alphabet Called "Hanyu Pinyin" in Mandarin Chinese.)
Practicing of Tones as it is a tonal language.
Changes in 3rd tone and Neutral Tone.

Module II
Greetings
Let me Introduce
The modal particle "ne".
Use of Please 'qing" – sit, have tea …….. etc.
A brief self introduction – Ni hao ma? Zaijian!
Use of "bu" negative.

Module III
Attributives showing possession
How is your Health? Thank you
Where are you from?
A few Professions like – Engineer, Businessman, Doctor, Teacher, Worker.
Are you busy with your work?
May I know your name?

Module IV
Use of "How many" – People in your family?
Use of "zhe" and "na".
Use of interrogative particle "shenme", "shui", "ma" and "nar".
How to make interrogative sentences ending with "ma".
Structural particle "de".
Use of "Nin" when and where to use and with whom. Use of guixing.
Use of verb "zuo" and how to make sentences with it.

Module V
Family structure and Relations.
Use of "you" – "mei you".
Measure words
Days and Weekdays.
Numbers.
Maps, different languages and Countries.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader Part I" Lesson 1-10

ANANDAM-I

Course Code: AND001 **Credit Units: 02**

Course Objective:
Aanandam is a credited subject that aims to instill the **joy of giving** and sharing in young people through community participation, helping them to be responsible citizens and be initiators of change for a healthy society. A daily act of goodness and charity will infuse the habit of community service in students. The faculty will emphasize shift in focus-Happiness is not in acquiring things, but permanent happiness comes from giving, sharing, and caring for someone. The faculty will inspire students for Individual Social Responsibility (ISR) and will inculcate the qualities of compassion, an open mind, a willingness to do whatever is needed and positive attitude in students. Imagination and Creativity are to be appreciated. An aim and a vision are to be developed in students.

OUTCOME OF AANANDAM COURSE

The student should develop:
• Awareness and empathy regarding community issues
• Interaction with the community and impact on society
• Interaction with mentor and development of Student teacher relationship
• Interaction among students, enlarge social network
• Cooperative and Communication skills and leadership qualities
• Critical thinking, Confidence and Efficiency

AANANDAM: COMMUNITY SERVICE

• Community service programs are very effective for students' personal and social, ethical, and academic development. These effects depend on the characteristics of the programs chosen
• Involvement of students in community work has an impact on development of student skills, creativity, critical thinking, and innovative powers. Passion and Positivity are basic requirements for Community service
• They would examine social challenges /problems, assess the needs of the community, evaluate previous implemented projects, and think of further solutions
• They would learn to cooperate and collaborate with other agencies and inculcate leadership qualities.

APPLIED MATHEMATICS – II

Course Code: AM 201 **Credit Units: 04**

Course Objective:

The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Contents:

Module I: Linear Algebra

Hermitian and Skew Hermitian Matrix, Unitary Matrix, Orthogonal Matrix, Elementary Row Transformation, Reduction of a Matrix to Row Echelon Form, Rank of a Matrix, Consistency of Linear Simultaneous Equations,

Gauss Elimination Method, Gauss-Jordan Method, Eigen Values and Eigen Vectors of a Matrix, Caley-Hamilton Theorem, Diagonalization of a Matrix, Vector Space, Linear Independence and Dependence of Vectors, Linear Transformations.

Module II: Infinite Series

Definition of Sequence, Bounded Sequence, Limit of a Sequence, Series, Finite and Infinite Series, Convergence and Divergence of Infinite series, Cauchy's Principle of Convergence, Positive Term Infinite Series, Comparison test, D'Alembert's Ratio test. Raabe's Test, Cauchy's nth root Test. Logarithmic Test, Alternating Series, Leibnitz's Test, Absolute and conditioinal convergence, Uniform Convergence, Power Series and its Interval of Convergence.

Module III: Complex Analysis

De Moivre's Theorem and Roots of Complex Numbers, Logarithmic Functions, Circular, Hyperbolic Functions and their Inverses.

Functions of a Complex Variables, Limits, Continuity and Derivatives, Analytic Function, Cauchy-Riemann Equations (without proof), Harmonic Function, Harmonic Conjugates, Conformal Mapping, Bilinear Transformations, Complex Line Integral, Cauchy Integral Theorem, Cauchy Integral Formula, Derivative of Analytic Function, Power Series, Taylor Series, Laurent Series, Zeroes and Singularities, Residues, Residue Theorem, Evaluation of Real Integrals of the Form $\int_0^{2\pi} F(\cos\theta, \sin\theta)\, d\theta$ and $\int_{-\infty}^{\infty} \frac{f(x)}{F(x)}\, dx$.

Module IV: Statistics and Probability

Moments, Skewness, Kurtosis, Random Variables and Probability Distribution, Mean and Variance of a Probability Distribution, Binomial Distribution, Poisson Distribution and Normal Distribution.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text & References:

- Engineering Mathematics by Erwin Kreyszig.
- Engineering Mathematics by R.K. Jain and S.R.K. Iyengar.
- Higher Engineering Mathematics by H.K. Dass.
- Engineering Mathematics by B.S. Grewal.
- Differential Calculus by Shanti Narain.
- Integral Calculus by Shanti Narain.
- Linear Algebra- Schaum Outline Series

APPLIED PHYSICS - II - MODERN PHYSICS

Course Code: AP- 202 **Credit Units: 03**

Course Objective:

Aim of this course is to introduce the students to fundamentals of graduate level physics which form the basis of all applied science and engineering

Course Contents:

Module I: Special Theory of Relativity

Michelson-Morley experiment, Importance of negative result, Inertial & non-inertial frames of reference, Einstein's postulates of Special theory of Relativity, Space-time coordinate system, Relativistic Space Time transformation (Lorentz transformation equation), Transformation of velocity, Addition of velocities, Length contraction and Time dilation, Mass-energy equivalence (Einstein's energy mass relation) & Derivation of Variation of mass with velocity,

Module II: Wave Mechanics

Wave particle duality, De-Broglie matter waves, phase and group velocity, Heisenberg uncertainty principle, wave function and its physical interpretation, Operators, expectation values. Time dependent & time independent Schrödinger wave equation for free & bound states, square well potential (rigid wall), Step potential.

Module III: Atomic Physics

Vector atom model, LS and j-j coupling, Zeceman effect (normal & anomalous), Paschen-Bach effect, X-ray spectra and energy level diagram, Moseleys Law, Lasers – Einstein coefficients, conditions for light amplification, population inversion, optical pumping, three level and four level lasers, He-Ne and Ruby laser, Properties and applications of lasers.

Module IV: Solid State Physics

Sommerfield's free electron theory of metals, Fermi energy, Introduction to periodic potential & Kronig-Penny model (Qualitative) Band Theory of Solids, Semi-conductors: Intrinsics and Extrinsic Semiconductors, photoconductivity and photovotaics, Basic aspects of Superconductivity, Meissner effect.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text & References:

- Concept of Modern Physics, A. Beiser
- Applied Physics II, Agarawal & Goel
- Solid State Physics, S. O. Pallai
- Physics of Atom, Wehr & Richards

ENVIRONMENT STUDIES

Course Code: EVS 001 **Credit Units: 04**

Course Objective:

The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour and the growth, development and maturity of living organisms. At present a great number of environment issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. A study of environmental studies is quite essential in all types of environmental sciences, environmental engineering and industrial management. The objective of environmental studies is to enlighten the masses about the importance of the protection and conservation of our environment and control of human activities which has an adverse effect on the environment.

Course Contents:

Module I: The multidisciplinary nature of environmental studies
Definition, scope and importance, Need for public awareness

Module II: Natural Resources
Renewable and non-renewable resources:
Natural resources and associated problems, Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems., Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies., Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Module III: Ecosystems
Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers
Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids
Introduction, types, characteristic features, structure and function of the following ecosystem:
Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

Module IV: Biodiversity and its conservation
Introduction – Definition: genetic, species and ecosystem diversity, Biogeographical classification of India
Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values
Biodiversity at global, national and local levels, India as a mega-diversity nation, Hot-spots of biodiversity
Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
Endangered and endemic species of India, Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

Module V: Environmental Pollution
Definition, Causes, effects and control measures of:
Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear pollution, Solid waste management: Causes, effects and control measures of urban and industrial wastes.
Role of an individual in prevention of pollution., Pollution case studies.
Disaster management: floods, earthquake, cyclone and landslides.

Module VI: Social Issues and the Environment
From unsustainable to sustainable development, Urban problems and related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people; its problems and concerns. Case studies., Environmental ethics: Issues and possible solutions
Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
Wasteland reclamation, Consumerism and waste products, Environmental Protection Act
Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act
Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation

Public awareness

Module VII: Human Population and the Environment
Population growth, variation among nations
Population explosion – Family Welfare Programmes
Environment and human health
Human Rights
Value Education
HIV / AIDS
Women and Child Welfare
Role of Information Technology in Environment and Human Health
Case Studies

Module VIII: Field Work
Visit to a local area to document environmental assets-river / forest/ grassland/ hill/ mountain.
Visit to a local polluted site – Urban / Rural / Industrial / Agricultural
Study of common plants, insects, birds
Study of simple ecosystems-pond, river, hill slopes, etc (Field work equal to 5 lecture hours)

Examination Scheme:

Components	CT	HA	S/V/Q	A	EE
Weightage (%)	15	15	15	5	50

Text & References:

- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380 013, India, Email:mapin@icenet.net (R)
- Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
- Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p
- De A.K., Environmental Chemistry, Wiley Eastern Ltd.
- Down to Earth, Centre for Science and Environment (R)
- Gleick, H.P. 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
- Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
- Heywood, V.H & Waston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
- Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.
- Mckinney, M.L. & School, R.M. 1996. Environmental Science Systems & Solutions, Web enhanced edition. 639p.
- Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB)
- Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
- Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
- Rao M N. & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
- Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut
- Survey of the Environment, The Hindu (M)
- Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science
- Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R)
- Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB)
- Wanger K.D., 1998 Environnemental Management. W.B. Saunders Co. Philadelphia, USA 499p

OBJECT ORIENTED PROGRAMMING USING C++

Course Code: BCS 203 Credit Units: 03

Course Objective:

The objective of this module is to introduce object oriented programming. To explore and implement the various features of OOP such as inheritance, polymorphism, Exceptional handling using programming language C++. After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.

Course Contents:

Module I: Introduction

Review of C, Difference between C and C++, Procedure Oriented and Object Oriented Approach. Basic Concepts: Objects, classes, Principals like Abstraction, Encapsulation, Inheritance and Polymorphism. Dynamic Binding, Message Passing. Characteristics of Object-Oriented Languages. Introduction to Object-Oriented Modeling techniques (Object, Functional and Dynamic Modeling).

Module II: 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.

Module III: 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.

Module IV: 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 V: Strings, Files and Exception Handling

Manipulating strings, Streams and files handling, formatted and Unformatted Input output. Exception handling, Generic Programming – function template, class Template Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterators, Other STL Elements, The Container Classes, General Theory of Operation, Vectors.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text & References:

Text:

- A.R. Venugopal, Rajkumar, T. Ravishanker "Mastering C++", TMH, 1997
- R. Lafore, "Object Oriented Programming using C++", BPB Publications, 2004.
- "Object Oriented Programming with C++" By E. Balagurusamy.
- Schildt Herbert, "C++: The Complete Reference", Wiley DreamTech, 2005.

References:

- Parasons, "Object Oriented Programming with C++", BPB Publication, 1999.
- Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication, 2002.
- Yashwant Kanethkar, "Object Oriented Programming using C++", BPB, 2004

ENGINEERING MECHANICS

Course Code: BME 204 **Credit Units: 03**

Course Objective:

Objective of this course is to provide fundamental knowledge of force system and its effect on the behaviour of the bodies that may be in dynamic or in static state. It includes the equilibrium of different structures like beams, frames, truss etc and the force transfer mechanism in the different components of a body under given loading condition.

Course Contents:

Module I: Force system & Structure
Free body diagram, Equilibrium equations and applications. Plane truss, perfect and imperfect truss, assumption in the truss analysis, analysis of perfect plane trusses by the method of joints, method of section.

Module II: Friction
Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, cone of friction, friction lock, efficiency of screw jack, transmission of power through belt

Module III: Distributed Force
Determination of center of gravity, center of mass and centroid by direct integration and by the method of composite bodies, mass moment of inertia and area moment of inertia by direct integration and composite bodies method, radius of gyration, parallel axis theorem, Pappus theorems and its application, polar moment of inertia.

Module IV: Work -Energy
Work energy equation, conservation of energy, Virtual work, impulse, momentum conservation, impact of bodies, co-efficient of restitution, loss of energy during impact, D'alembert principle

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text & References:

- S.S. Bhavikatti, Engineering Mechanics, New Age International Ltd
- Timoshenko, Engineering Mechanics, McGraw Hill
- R. S. Khurmi, Engineering Mechanics, S. Chand Publication
- I. H. Shames & G. K. M. Rao, Engineering Mechanics, Pearson Education, 2006

ENGINEERING GRAPHICS

Course Code: BME 205 Credit Units: 01

Course Contents:

Module 1: Scales & Curves
Representative factor, Plain Scales, Diagonal Scales, Comparative Scales and Scale of chords. Construction of ellipse, Parabola, Hyperbola, Cycloid, Epicycloid, Hypocycloid, Involutes and Spirals by various methods.

Module 2: Projection of Points & Straight lines
Projection of points, Projection of straight lines. True inclinations and true length of straight lines.

Module 3: Projection of planes and solids
Projection of circle, triangle, polygons, polyhedrons, pyramids, cylinders and cones in different positions.

Module 4: Section of solids and Isometric projections
Section of right solids by normal and inclined planes, Orthographic projection, first angle & third angle projection. Isometric scale, Isometric axes, Isometric projection from orthographic drawing.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text & References:

- Engineering Graphics – Basant Agrawal and Dr. C. M. Agrawal, Tata McGraw-Hill Publishing Company Ltd.
- Engineering Drawing – by N. D. Bhatt
- Engineering Drawing and Graphics – by Veenugopal
- Engineering Drawing – by T. Jeyopoovan

APPLIED PHYSICS LAB - II

Course Code: AP 222 **Credit Units: 01**

List of Experiments:

1. To determine the wavelength of prominent lines of mercury spectrum using plane transmission grating.
2. To determine the thickness of a given wire by Wedge method.
3. To determine the wavelength of He-Ne laser light using single slit.
4. To determine the frequency of an electrically maintained tunning fork by Melde's method.
5. To study the variation of magnetic field along the axis of Helmholtz coil and to find out reduction factor.
6. To draw the V – I characteristics of a forward and reverse bias PN junction diode.
7. To determine the frequency of AC mains using sonometer.
8. To determine the energy band-gap of Germanium crystal using four probes method.
9. To draw V – I characteristics of a photocell and to verify the inverse square law of radiation.
10. To determine the acceleration due to gravity ('g') using Keter's reversible pendulum.
11. To study the characteristics of photo voltaic cell (solar cell).

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	15	15	15	25	25

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

OBJECT ORIENTED PROGRAMMING USING C++ LAB

Course Code: BCS 223 **Credit Units: 01**

Software Required: Turbo C++

Course Contents:

- Creation of objects in programs and solving problems through them.
- Different use of private, public member variables and functions and friend functions.
- Use of constructors and destructors.
- Operator overloading
- Use of inheritance in and accessing objects of different derived classes.
- Polymorphism and virtual functions (using pointers).
- File handling.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	15	15	15	25	25

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

ENGINEERING MECHANICS LAB

Course Code: BME 224 **Credit Units: 01**

Course Contents:

Engineering Mechanics:

- To verify the law of Force Polygon
- To verify the law of Moments using Parallel Force apparatus. (Simply supported type)
- To determine the co-efficient of friction between wood and various surface (like
- Leather, Wood, Aluminum) on an inclined plane.
- To find the forces in the members of Jib Crane.
- To determine the mechanical advantage, Velocity ratio and efficiency of a screw jack.
- To determine the mechanical advantage, Velocity ratio and Mechanical efficiency of the
- Wheel and Axle
- To determine the MA, VR, η of Worm Wheel (2-start)
- Verification of force transmitted by members of given truss.
- To verify the law of moments using Bell crank lever
- To find CG and moment of Inertia of an irregular body using Computation method

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	15	15	15	25	25

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

ENGINEERING GRAPHICS LAB

Course Code: BME 225 Credit Units: 01

Course Objective:

This course will provide students concepts on the drawings of different curves like straight line, parabola, ellipse etc. After completion of this course, students will be able to draw different figures manually and will be capable of using various instruments involved in drawings.

Course Contents:

Module I: General
Importance, Significance and scope of engineering drawing, Lettering, Dimensioning, Scales, Sense of proportioning, Different types of projections, Orthographic Projection, B.I.S. Specifications.

Module II: Projections of Point and Lines
Introduction of planes of projection, Reference and auxiliary planes, projections of points and Lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on Auxiliary planes, shortest distance, intersecting and non-intersecting lines.

Module III: Planes other than the Reference Planes
Introduction of other planes (perpendicular and oblique), their traces, inclinations etc., Projections of points and lines lying in the planes, conversion of oblique plane into auxiliary Plane and solution of related problems.

Module IV: Projections of Plane Figures
Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one of both reference planes). Obtaining true shape of the plane figure by projection.

Module V: Projection of Solids
Simple cases when solid is placed in different positions, Axis faces and lines lying in the faces of the solid making given angles.

Module VI: Development of Surface
Development of simple objects with and without sectioning. Isometric Projection

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	15	15	15	25	25

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

Text & References:

- M.B. Shah & B.C. Rana, Engineering Drawing, Pearson Education, 2007
- PS Gill, Engineering Drawing, Kataria Publication
- ND Bhatt, Engineering Drawing, Charotar publications
- N Sidheshwar, Engineering Drawing, Tata McGraw Hill
- CL tanta, Mechanical Drawing, “Dhanpat Rai”

ENGLISH

Course Code: BCS 201 **Credit Units: 01**

Course Objective:

The course is intended to give a foundation of English Language. The literary texts are indented to help students to inculcate creative & aesthetic sensitivity and critical faculty through comprehension, appreciation and analysis of the prescribed literary texts. It will also help them to respond form different perspectives.

Course Contents:

Module I: Vocabulary

Use of Dictionary, Use of Words: Diminutives, Homonyms & Homophones

Module II: Essentials of Grammar - I

Articles**,** Parts of Speech, Tenses

Module III: Essentials of Grammar - II

Sentence Structure, Subject -Verb agreement, Punctuation

Module IV: Communication

The process and importance, Principles & benefits of Effective Communication

Module V: Spoken English Communication

Speech Drills , Pronunciation and accent, Stress and Intonation

Module VI: Communication Skills - I

Developing listening skills, Developing speaking skills

Module VII: Communication Skills - II

Developing Reading Skills, Developing writing Skills

Module VIII: Written English communication

Progression of Thought/ideas, Structure of Paragraph, Structure of Essays

Module IX: Short Stories

Of Studies, by Francis Bacon, Dream Children, by Charles Lamb, The Necklace, by Guy de Maupassant
A Shadow, by R.K.Narayan, Glory at Twilight, Bhabani Bhattacharya

Module X: Poems

All the Worlds a Stage	Shakespeare
To Autumn	Keats
O! Captain, My Captain.	Walt Whitman
Where the Mind is Without Fear	Rabindranath Tagore
Psalm of Life	H.W. Longfellow

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

Text & References:

- Madhulika Jha, Echoes, Orient Long Man
- Ramon & Prakash, Business Communication, Oxford.
- Sydney Greenbaum Oxford English Grammar, Oxford.
- Successful Communications, Malra Treece (Allyn and Bacon)
- Effective Technical Communication, M. Ashraf Rizvi.

BEHAVIOURAL SCIENCE - II
(PROBLEM SOLVING AND CREATIVE THINKING)

Course Code: BSS 204 **Credit Units: 01**

Course Objective:

To enable the students:

- Understand the process of problem solving and creative thinking.
- Facilitation and enhancement of skills required for decision-making.

Course Contents:

Module I: Thinking as a tool for Problem Solving
What is thinking: The Mind/Brain/Behaviour
Critical Thinking and Learning: Making Predictions and Reasoning , Memory and Critical Thinking
Emotions and Critical Thinking , Thinking skills

Module II: Hindrances to Problem Solving Process
Perception, Expression, Emotion, Intellect, Work environment

Module III: Problem Solving
Recognizing and Defining a problem, Analyzing the problem (potential causes), Developing possible alternatives, Evaluating Solutions, Resolution of problem, Implementation , Barriers to problem solving: Perception, Expression, Emotion, Intellect, Work environment

Module IV: Plan of Action
Construction of POA, Monitoring, Reviewing and analyzing the outcome

Module V: Creative Thinking
Definition and meaning of creativity, The nature of creative thinking, Convergent and Divergent thinking
Idea generation and evaluation (Brain Storming), Image generation and evaluation, Debating
The six-phase model of Creative Thinking: ICEDIP model

Module VI: End-of-Semester Appraisal
Viva based on personal journal, Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:

- Michael Steven: How to be a better problem solver, Kogan Page, New Delhi, 1999
- Geoff Petty: How to be better at creativity; Kogan Page, New Delhi, 1999
- Richard Y. Chang and P. Keith, Kelly: Wheeler Publishing, New Delhi, 1998.
- Phil Lowe Koge Page: Creativity and Problem Solving, New Delhi, 1996
- J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 3, Management (1996); Pfeiffer & Company
- Bensley, Alan D.: Critical Thinking in Psychology – A Unified Skills Approach, (1998), Brooks/Cole Publishing Company.

FRENCH - II

Course Code: FLT 201 **Credit Units: 02**

Course Objective:

To enable the students to overcome the fear of speaking a foreign language and take position as a foreigner speaking French.

To make them learn the basic rules of French Grammar.

Course Contents:

Module A: pp.38 – 47: Unité 3 : Objectif 3, 4, 5. 6

Module B: pp. 47 to 75 Unité 4, 5

Contenu lexical:

Unité 3: Organiser son temps

1. donner/demander des informations sur un emploi du temps, un horaire SNCF – Imaginer un dialogue
2. rédiger un message/ une lettre pour …
   i) prendre un rendez-vous/ accepter et confirmer/ annuler
   ii) inviter/accepter/refuser
3. Faire un programme d'activités
   imaginer une conversation téléphonique/un dialogue
   Propositions- interroger, répondre

Unité 4: Découvrir son environnement

1. situer un lieu
2. s'orienter, s'informer sur un itinéraire.
3. Chercher, décrire un logement
4. connaître les rythmes de la vie

Unité 5 : s'informer

1. demander/donner des informations sur un emploi du temps passé.
2. donner une explication, exprimer le doute ou la certitude.
3. découvrir les relations entre les mots
4. savoir s'informer

Contenu grammatical:

1. Adjectifs démonstratifs
2. Adjectifs possessifs/exprimer la possession à l'aide de :
   i. « de » ii. A+nom/pronom disjoint
3. Conjugaison pronominale – négative, interrogative - construction à l'infinitif
4. Impératif/exprimer l'obligation/l'interdiction à l'aide de « il faut…. »/ «il ne faut pas… »
5. passé composé
6. Questions directes/indirectes

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- le livre à suivre : Campus: Tome 1

GERMAN – II

Course Code: FLG 201 Credit Units: 02

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany. Introduction to Grammar to consolidate the language base learnt in Semester I

Course Contents:

Module I: Everything about Time and Time periods
Time and times of the day.
Weekdays, months, seasons.
Adverbs of time and time related prepositions

Module II: Irregular verbs
Introduction to irregular verbs like to be, and others, to learn the conjugations of the same, (fahren, essen, lessen, schlafen, sprechen und ähnliche).

Module III: Separable verbs
To comprehend the change in meaning that the verbs undergo when used as such
Treatment of such verbs with separable prefixes

Module IV: Reading and comprehension
Reading and deciphering railway schedules/school time table
Usage of separable verbs in the above context

Module V: Accusative case
Accusative case with the relevant articles
Introduction to 2 different kinds of sentences – Nominative and Accusative

Module VI: Accusative personal pronouns
Nominative and accusative in comparison
Emphasizing on the universal applicability of the pronouns to both persons and objects

Module VII: Accusative prepositions
Accusative propositions with their use
Both theoretical and figurative use

Module VIII: Dialogues
Dialogue reading: 'In the market place'
'At the Hotel'

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach , Deutsche Sprachlehre für Ausländer
- P.L Aneja , Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH – II

Course Code: FLS 201 Credit Units: 02

Course Objective:

To enable students acquire more vocabulary, grammar, Verbal Phrases to understand simple texts and start describing any person or object in Simple Present Tense.

Course Contents:

Module I
Revision of earlier modules.

Module II
Some more AR/ER/IR verbs. Introduction to root changing and irregular AR/ER/IR ending verbs

Module III
More verbal phrases (eg, Dios Mio, Que lastima etc), adverbs *(bueno/malo, muy, mucho, bastante, poco).*
Simple texts based on grammar and vocabulary done in earlier modules.

Module IV
Possessive pronouns

Module V
Writing/speaking essays like my friend, my house, my school/institution, myself….descriptions of people, objects etc, computer/internet related vocabulary

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras

CHINESE – II

Course Code: FLC 201 **Credit Units: 02**

Course Objective:

Chinese is a tonal language where each syllable in isolation has its definite tone (flat, falling, rising and rising/falling), and same syllables with different tones mean different things. When you say, "ma" with a third tone, it mean horse and "ma" with the first tone is Mother. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I

Drills**,** Practice reading aloud Observe Picture and answer the question.
Tone practice. Practice using the language both by speaking and by taking notes.
Introduction of basic sentence patterns. Measure words. Glad to meet you.

Module II

Where do you live? Learning different colors. Tones of "bu"
Buying things and how muchit costs? Dialogue on change of Money.
More sentence patterns on Days and Weekdays.
How to tell time. Saying the units of time in Chinese. Learning to say useful phrases like – 8:00, 11:25, 10:30 P.M. everyday, afternoon, evening, night, morning 3:58, one hour, to begin, to end ….. etc.
Morning, Afternoon, Evening, Night.

Module III

Use of words of location like-li, wais hang, xia, Furniture – table, chair, bed, bookshelf,.. etc.
Description of room, house or hostel room.. eg what is placed where and how many things are there in it?
Review Lessons – Preview Lessons. Expression 'yao", "xiang" and "yaoshi" (if).
Days of week, months in a year etc. I am learning Chinese. Is Chinese difficult?

Module IV

Counting from 1-1000, Use of "chang-chang".
Making an Inquiry – What time is it now? Where is the Post Office?
Days of the week. Months in a year. Use of Preposition – "zai", "gen".
Use of interrogative pronoun – "duoshao" and "ji". "Whose"??? Sweater etc is it?
Different Games and going out for exercise in the morning.

Module V

The verb "qu"
- Going to the library issuing a book from the library
- Going to the cinema hall, buying tickets
- Going to the post office, buying stamps
- Going to the market to buy things.. etc
- Going to the buy clothes …. Etc.

Hobby. I also like swimming.
Comprehension and answer questions based on it.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader Part I" Lesson 11-20

ANANDAM-II

Course Code: AND002 **Credit Units: 02**

Course Objective:
Aanandam is a credited subject that aims to instill the **joy of giving** and sharing in young people through community participation, helping them to be responsible citizens and be initiators of change for a healthy society. A daily act of goodness and charity will infuse the habit of community service in students. The faculty will emphasize shift in focus-Happiness is not in acquiring things, but permanent happiness comes from giving, sharing, and caring for someone. The faculty will inspire students for Individual Social Responsibility (ISR) and will inculcate the qualities of compassion, an open mind, a willingness to do whatever is needed and positive attitude in students. Imagination and Creativity are to be appreciated. An aim and a vision are to be developed in students.

OUTCOME OF AANANDAM COURSE

The student should develop:
• Awareness and empathy regarding community issues
• Interaction with the community and impact on society
• Interaction with mentor and development of Student teacher relationship
• Interaction among students, enlarge social network
• Cooperative and Communication skills and leadership qualities
• Critical thinking, Confidence and Efficiency

AANANDAM: COMMUNITY SERVICE

• Community service programs are very effective for students' personal and social, ethical, and academic development. These effects depend on the characteristics of the programs chosen
• Involvement of students in community work has an impact on development of student skills, creativity, critical thinking, and innovative powers. Passion and Positivity are basic requirements for Community service
• They would examine social challenges /problems, assess the needs of the community, evaluate previous implemented projects, and think of further solutions
• They would learn to cooperate and collaborate with other agencies and inculcate leadership qualities.

APPLIED MATHEMATICS – III

Course Code: AM 301 **Credit Units: 04**

Course Objective:

The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Contents:

Module I: Partial Differential Equations

Formation of PDE, Equations solvable by direct integration, Linear equations of the first order, Non-linear equations of the first order, Charpit's method, Homogeneous linear equations with constant coefficients, Non homogeneous linear equations.

Module II: Fourier Series

Periodic Functions, Fourier Series, Functions having points of discontinuity, Even or Odd Functions, Change of Interval, Half-range series, , Parseval's Formula, Complex form of Fourier series, Practical Harmonic Analysis, Fourier Transforms, Sine and Cosine Transforms.

Module III: Laplace Transformation

Definition, Transforms of elementary functions, Properties of Laplace transforms, Existence conditions, Transforms of derivatives, Transforms of integrals, Evaluation of integrals by Laplace transform, Inverse transforms, Other methods of finding inverse transforms, Convolution theorem, Application to differential equations, Simultaneous linear equations with constant coefficients, Unit step functions, Periodic functions.

Module IV: Linear Programming

Formulation of the problem, Graphical method, Canonical and Standard forms of L.P.P. Simplex Method, Artificial variable Techniques-M-method, Two phase method, Degeneracy, Dual simplex method.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text & References:

Text:

- Differential Calculus by Shanti Narain
- Integral Calculus by Shanti Narain
- Higher Engineering Mathematics by B.S. Grewal

References:

- Differential Equations by A.R. Forsyth
- Partial Differential Equations by I.N. Snedon
- Higher Engineering Mathematics by H.K. Dass

FLUID AND PARTICLE MECHANICS

Course Code: BTH 302 Credit Units: 04

Course Objective:
The objective of Fluid Mechanics subject is that students should understand the, properties of fluids, pressure measurement devices, hydraulic forces on surfaces, bouncy and flotation in fluids, kinematics and static behaviour of fluids, dimension and model analysis, laminar and turbulent flow, flow through pipes and orifices, boundary layer theory.

Course Contents:

Module I: Fluid Properties and Fluid Statics
Newtonian and Non-Newtonian Fluids; Viscosity; Incompressible and compressible fluids, compressibility. Forces on plane surfaces, forces on curved surfaces, buoyant forces, and stability of floating bodies, metacentre and metacentre height.

Module II: Kinematics of Fluid Motion
Steady and unsteady flow; uniform and non-uniform flow; Laminar and turbulent flow; streamline, path line and streak line; continuity equation, irrotational and rotational flow, velocity potential and stream function, vortex flow, free and forced vortex.

Module III: Dynamics of Fluid Flow
Euler's equation of motion and its integration to yield Bernoulli's equation, its practical applications – Pilot tube, Venturi meter; steady flow momentum equation, force exerted on a pipe bend.

Module IV: Dimensional Analysis and Principles of Similarity
Buckingham π-Theorem and its applications, Geometric, Kinematics and Dynamic similarity; Dimensionless numbers-Reynolds, Froude, Euler, Mach, Weber Number and their significance.

Module V: Laminar and Turbulent Flow
Reynold's experiment, critical velocity, steady laminar flow through a circular tube, flow between parallel plates. Transition from laminar to turbulent flow, courses of turbulence, velocity distribution law near a solid boundary, velocity distribution in rough pipes, Hazen – Williams's formula.

Module VI: Analysis of Pipe Flow
Energy losses, minor losses in pipe lines, concept of equivalent length, flow between two reservoirs, and multiple pipe systems – in series and parallel, siphon.

Module VII: Flow Measurements
Measurement of flow using Venturi meter, orifice meter, Pitot tube, measurement of flow in open channels – rectangular, triangular, trapezoidal weir, Cipoeletti weir.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text:

- Bansal, R.K.. "Fluid Mechanics & Hydraulic Machines", Laxmi Publications (P) Ltd., 2002.
- Kumar, D.S., "Fluid Mechanics and Fluid Power Engineering", S.K. Kataria & Sons, 2000.

References:

- White, F. M., Introduction to Fluid Mechanics, McGraw Hill
- Shames, I.H. "Mechanics of Fluids", Tata McGraw Hill
- Douglas, J. F., Gasiorek, J.M. and Swaffield, J., Fluid Mechanics, Pearson Education, 4/e, 2006
- Streeter, V.L and Wylie,E. B. "Fluid Mechanics", Tata McGraw Hill
- De Nevers N H-Fluid Mechanics for Chemical Engineers, McGraw Hill, NY(1991)

CHEMICAL PROCESS CALCULATIONS

Course Code: BTH 303 Credit Units: 04

Course Objective:

The understanding of chemical process calculations will equip the students with basic quantitative skills applicable to various chemical and physical processes.

Module I: Introduction to Material balances
Overall and component material balances; Material balance with and without chemical r1eactions; Material balance involving multiple subsystems; Recycle, bypass and purge; Material balance involving phase change.

Module II: Energy Balances
Enthalpy changes; Energy balance with and without chemical reaction; reversible process and mechanical energy balance; Heats of solution and mixing; Humidity charts and their uses in solving humidification , dehumidification and water cooling problems.
Combustion ; Adiabatic flame temperature.

Module III: Simultaneous material and energy balances
Degrees of freedom in steady –state processes; Simultaneous material and energy balance problems using flow sheet codes; unsteady state material and energy balances.

Module IV: Applications
Material and energy balance calculations of some selected process plants such as sulfuric acid , ammonia, urea, caustic soda etc.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	15	15	50

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

Text Books :

- Bhatt, B. L. and Vora, S. M., 'Stoichiometry', Tata McGraw-Hill Publishing Co., New Delhi.
- ' Process calculations for chemical engineering", Second Revised Edition, Chemical Engineering Education Development Centre, IIT, Madras.
- Himmelblau, D. M., " Basic Principles and Calculations in Chemical Engineering', Prentice hall, Inc.

References:

Hougen, O.A., Watson. K.M. and Ragatz, R.A. Chemical Process principles Part –I', John Wiley**& Sons,** (CBS Publishers & distributor, New Delhi).

CHEMICAL TECHNOLOGY-I

Course Code: BTH 304 Credit Units: 03

Course Objective:

This course would familiarize the students about the availability of raw materials to various industries and process technologies for the conversion of this into final products. Make them appreciate production trends and future prospects in various process industries It would also acquaint them in drawing flow diagrams for various manufacturing processes.

Module-1

Nitrogen Industries: Ammonia, nitric acid, ammonium sulphate, ammonium nitrate, urea, calcium ammonium nitrate.
Sulphur Industries: Sulphur dioxide, sulphuric acid, oleum
Phosphorus Industries: Phosphorus, phosphoric acid, phosphatic fertilizers.
Mixed Fertilizer: N.P.K. fertilizers, diammonium hydrogen phosphate.

Module-2

Chlor-Alkali Industries: Brine electrolysis, manufacture of caustic soda and chlorine in mercury cells, diaphragm cells, membrane cells, hydrochloric acid. Soda ash.
Industrial and Fuel Gases: Oxygen, nitrogen, hydrogen, carbon dioxide, natural gas, LPG, producer gas, water gas, carbureted water gas, coke oven gas, synthesis gas.

Module-3

Ceremic Industries: Portland cement, Other Cement, Lime, Gypsum.
Glass Industries: Methods of manufacture of glass and special glasses.
Metallurgical Industries: Iron and steel.

Module-4

Explosives, Propellants, and Toxic Chemical Agents: Types and characteristics of explosives, industrial explosives, propellants, rockets and Missiles, propellants for rockets.
Cryogenics in chemical industries

Text Books:-

1. Rao, M.G. and Sittig, M., Dryden's Outlines of Chemical Technology-for the 21st century, Affiliated East West Press (1998) 3rd ed.
2. Austin, G.T., Shreve's Chemical Process Industries, McGraw Hill (1998) 5th ed.

Reference Book:-

1. Faith, W.L., Keyes, D.B. and Clark, R.L, Industrial Chemicals, John Wiley (1980) 4th ed.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text & References:

Text:

1. Austin, G.T., "Shreve's Chemical Processes Industries", 5th Edn (1984) Mcgraw-Hill Book Co., Singapore.
2. Sittig M and Gopal Rao M, "Dryden's Outlines of Chemical Technology", 3rd Ed.., (1997) East -West Press, New Delhi .

References:

1 "Chemtech" VolI-IV, 1975-1978 Chemical Engineering Education Development centre, IIT

DOMAIN ELECTIVE-I
MATERIAL SCIENCE

Course Code: BTH 305 Credit Units: 04

Course Objective:
Metallurgy and Materials deal with the structure and properties of all materials, which have engineering applications. Metallurgists and Materials Engineers are responsible for designing, producing, examining and testing materials as diverse as metallic engineering alloys, semiconductors and superconductors, ceramics, plastics and composites. This course will help students understand the properties of different types of materials and their applications.

Course Contents:

Module I
Atomic structure of metals crystal structure, crystal lattice of (i) Body centered cubic (ii) face centered cubic (iii) closed packed hexagonal, crystallographic notation of atomic planes, polymorphism and allotropy, solidification of crystallization (i) nuclear formation (crystal growth) (ii) crystal imperfection Elementary treatment of theories of plastic deformation, phenomenon of slip twinning, dislocation, identification of crystallographic possible slip planes and direction in FCC, BCC, C.P., recovery, re-crystallization, preferred orientation causes and effects on the property of metals.

Module II
Introduction to Engineering materials, their mechanical behaviour, testing and manufacturing properties of materials, physical properties of materials, classification of engineering materials.

Module III
General principles of phase transformation in alloys, phase rule and equilibrium diagrams, Equilibrium diagrams of Binary system in which the components form a mechanical mixture of crystals in the solid state and are completely mutually soluble in both liquid state. Equilibrium diagrams of a systems whose components have complete mutual solubility in the liquid state and limited solubility in the solid state in which the solid state solubility deceases with temperature. Equilibrium diagram of alloys whose components have complete mutual solubility in the liquid state and limited solubility in solid state (Alloy with a peritectic transformation) Equilibrium diagrams of a system whose components are subject to allotropic change.

Module IV
Principles and applications of heat treatment processes viz. annealing, normalizing hardening, tempering; harden ability & its measurement, surface hardening processes. Defects in heat treatment and their remedies; effects produced by alloying elements on the structures and properties of steel. Distribution of alloying elements (Si, Mn. Ni. Cr. Mo. TL. Al) in steel.

Module V
Ceramic:Structure ; application and processing; Clays; Refractories; Abrasives; cement
Introduction to nano-materials and structure sensitive materials

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text Books:

- V. Raghavan, "Material Science & Engineering", Prentice Hall India Ltd., 2001.
- Shackelford, J.F. and Muralidhara, M.K., Introduction to Material Science for Engineers (6/e), Pearson Education, 2007
- S.K. Hazra Chaudhuri, "Material Science & Processes", Indian Book Publishers, Calcutta, 1983.
- R.B. Gupta, "Material Science Processes", Satya Prakashan, New Delhi, 2000.

References:

- Raymond A Higgim., "Engineering Metallurgy Part 1", Prentice Hall India, New Delhi, 1998.
- Buduisky et al, "Engineering Materials & Properties", Prentice Hall India, New Delhi, 2004.
- Peter Haasten, "Physical Metallurgy", Cambridge Univ. Press, 1996.

DOMAIN ELECTIVE-III
POLYMER TECHNOLOGY

Course Code: BTH 306 **Credit Units: 04**

Unit -I

Introduction: Concepts of polymers, Classification of polymers based on: structures, configuration, application, tacticity, crystallinity, mode of formation, molecular weight distribution, Concept of Mn, Mz, Mv and Mz and measurement techniques, Functionality principle, Glass transition temperature and its measurement, Theory of polymer solutions: solubility parameter, Mark-Houwink-Sakurda equation.

Unit –II

Techniques Of Polymerization: Bulk polymerization, Solution polymerization, Suspension polymerization, Emulsion polymerization and its kinetics, Comparison of bulk, solution, emulsion and suspension polymerization techniques. Chain growth polymerization: mechanism and kinetics of free radical, anionic, cationic and co-ordination polymerization, Comparison between addition and condensation polymerization, Co polymerization: Types of co polymers, monomer reactivity ratio, block and graft copolymers.

Unit-III

Polymer Material:-

Fibers: Properties and applications of fibers: Cellulosic, Nylons, Acrylic, Vinyl and Vinyledene Glass fiber, Carbon fiber, Aramid fiber.

Plastics: Synthesis, properties and applications of LDPE, HDPE, LLDPE, PP, PS, PVC, PMMA, ABS, Nylons (6, 66), PF, UF, MF, Epoxy Resins, Silicon, Poly acetal, Polycarbonate, Poly urethane, Poly ethylene Terephthalate (PET), PTFE, Cellulose Acetate, Cellulose Nitrate, and Furan resins

Rubbers: Structure, properties and applications of Natural Rubber, Latex and its uses in manufacturing of articles), Poly chloroprene, Silicon rubber, SBR, Nitrile rubber, Butyl rubber, EPDM, Poly isobutylene rubber.

Miscellaneous: Biodegradable polymers, Conductive polymers, Heat resistance polymers

Unit –IV

Polymer Technology:-

Curing of polymer, polymer processing such as injection moulding, compression moulding, blow moulding, extruders, rotational moulding, thermoforming, calandering, spinning.

Text Books:-

Polymer Science & Technology by Joel R. Fried, PHI Publication.

Polymer Science by Gowariker, Wiley Eastern Publication

Recommended Books;-

Polymer Science & Technology Plastics and Rubbers by P Ghosh, Tata McGraw Hill Publication.

Principles of Polymer Systems by Ferdinand Rodriguez, Tata McGraw Hill Publication.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

FLUID MECHANICS LAB

Course Code: BTH 322 **Credit Units: 01**

1 .Measurement of viscosity and surface tension-Reynolds Experiment
2. Verification of Bernoulli's Theorem
3. Experiment using Venturimeter
4. Determination of coefficient of Discharge C_d, C_c, $C_!$ Using
5. Circular/triangular/rectangular orifice
6. To find major head losses in a pipe line
7. To find minor head losses in a pipe line (sudden expansion/contraction/bend)

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	15	15	15	25	25

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

COMMUNICATION SKILLS - I

Course Code: BCS 301 **Credit Units:01**

Course Objective:

To form written communication strategies necessary in the workplace

Course Contents:

Module I: Introduction to Writing Skills
Effective Writing Skills
Avoiding Common Errors
Paragraph Writing
Note Taking
Writing Assignments

Module II: Letter Writing
Types
Formats

Module III
Memo
Agenda and Minutes
Notice and Circulars

Module IV: Report Writing
Purpose and Scope of a Report
Fundamental Principles of Report Writing
Project Report Writing
Summer Internship Reports

Examination Scheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage (%)	20	20	25	10	10	10	5

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

Text & References:

- Business Communication, Raman – Prakash, Oxford
- Creative English for Communication, Krishnaswamy N, Macmillan
- Textbook of Business Communication, Ramaswami S, Macmillan
- Working in English, Jones, Cambridge
- A Writer's Workbook Fourth edition, Smoke, Cambridge
- Effective Writing, Withrow, Cambridge
- Writing Skills, Coe/Rycroft/Ernest, Cambridge
- Welcome!, Jones, Cambridge

BEHAVIOURAL SCIENCE - III
(INTERPERSONAL COMMUNICATION)

Course Code: BSS 304 **Credit Units: 01**

Course Objective:
This course provides practical guidance on
- Enhancing personal effectiveness and performance through effective interpersonal communication
- Enhancing their conflict management and negotiation skills

Course Contents:

Module I: Interpersonal Communication: An Introduction
Importance of Interpersonal Communication
Types – Self and Other Oriented
Rapport Building – NLP, Communication Mode
Steps to improve Interpersonal Communication

Module II: Behavioural Communication
Meaning and Nature of behavioiural communication
Persuasion, Influence, Listening and Questioning
Guidelines for developing Human Communication skills
Relevance of Behavioural Communication for personal and professional development

Module III: Interpersonal Styles
Transactional Analysis
Life Position/Script Analysis
Games Analysis
Interactional and Transactional Styles

Module IV: Conflict Management
Meaning and nature of conflicts
Styles and techniques of conflict management
Conflict management and interpersonal communication

Module V: Negotiation Skills
Meaning and Negotiation approaches (Traditional and Contemporary)
Process and strategies of negotiations
Negotiation and interpersonal communication

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:

- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassel
- Goddard, Ken: Informative Writing, 1995 1st Edition, Cassell
- Harvard Business School, Effective Communication: United States of America
- Foster John, Effective Writing Skills: Volume-7, First Edition 2000, Institute of Public Relations (IPR)
- Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers.

FRENCH-III

Course Code: FLT 301 Credit Units: 02

Course Objective:

To provide the students with the know-how

- To master the current social communication skills in oral and in written.
- To enrich the formulations, the linguistic tools and vary the sentence construction without repetition.

Course Contents:

Module B: pp. 76 – 88 Unité 6

Module C: pp. 89 to103 Unité 7

Contenu lexical:

Unité 6: se faire plaisir

1. acheter : exprimer ses choix, décrire un objet (forme, dimension, poids et matières) payer
2. parler de la nourriture, deux façons d'exprimer la quantité, commander un repas au restaurant
3. parler des différentes occasions de faire la fête

Unité 7: Cultiver ses relations

1. maîtriser les actes de la communication sociale courante (Salutations, présentations, invitations, remerciements)
2. annoncer un événement, exprimer un souhait, remercier, s'excuser par écrit.
3. caractériser une personne (aspect physique et caractère)

Contenu grammatical:

1. accord des adjectifs qualificatifs
2. articles partitifs
3. Négations avec de, ne…rien/personne/plus
4. Questions avec combien, quel…
5. expressions de la quantité
6. ne…plus/toujours - encore
7. pronoms compléments directs et indirects
8. accord du participe passé (auxiliaire « avoir ») avec l'objet direct
9. Impératif avec un pronom complément direct ou indirect
10. construction avec « que » - Je crois que/ Je pense que/ Je sais que

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

Text & References:

- le livre à suivre : Campus: Tome 1

GERMAN - III

Course Code: FLG 301 Credit Units: 02

Course Objective:
To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Course Contents:

Module I: Modal verbs
Modal verbs with conjugations and usage
Imparting the finer nuances of the language

Module II: Information about Germany (ongoing)
Information about Germany in the form of presentations or "Referat"– neighbors, states and capitals, important cities and towns and characteristic features of the same, and also a few other topics related to Germany.

Module III: Dative case
Dative case, comparison with accusative case
Dative case with the relevant articles
Introduction to 3 different kinds of sentences – nominative, accusative and dative

Module IV: Dative personal pronouns
Nominative, accusative and dative pronouns in comparison

Module V: Dative prepositions
Dative preposition with their usage both theoretical and figurative use

Module VI: Dialogues
In the Restaurant,

At the Tourist Information Office,

A telephone conversation

Module VII: Directions
Names of the directions
Asking and telling the directions with the help of a roadmap
Module VIII: Conjunctions

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH – III

Course Code: FLS 301 Credit Units: 02

Course Objective:

To enable students acquire knowledge of the Set/definite expressions (idiomatic expressions) in Spanish language and to handle some Spanish situations with ease.

Course Contents:

Module I
Revision of earlier semester modules
Set expressions (idiomatic expressions) with the verb *Tener*, *Poner, Ir*….
Weather

Module II
Introduction to *Gustar*…and all its forms. Revision of *Gustar* and usage of it

Module III
Translation of Spanish-English; English-Spanish. Practice sentences.
How to ask for directions (using estar)
Introduction to IR + A + INFINITIVE FORM OF A VERB

Module IV
Simple conversation with help of texts and vocabulary
En el restaurante
En el instituto
En el aeropuerto

Module V
Reflexives

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras -Nivel Elemental

CHINESE – III

Course Code: FLC 301 Credit Units: 02

Course Objective:
Foreign words are usually imported by translating the concept into Chinese, the emphasis is on the meaning rather than the sound. But the system runs into a problem because the underlying name of personal name is often obscure so they are almost always transcribed according to their pronciation alone. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:
Module I
Drills
Dialogue practice
Observe picture and answer the question.
Introduction of written characters.
Practice reading aloud
Practice using the language both by speaking and by taking notes.
Character writing and stroke order

Module II
Measure words
Position words e.g. inside, outside, middle, in front, behind, top, bottom, side, left, right, straight.
Directional words – beibian, xibian, nanbian, dongbian, zhongjian.
Our school and its different building locations.
What game do you like?
Difference between "hii" and "neng", "keyi".

Module III
Changing affirmative sentences to negative ones and vice versa
Human body parts.
Not feeling well words e.g. ; fever, cold, stomach ache, head ache.
Use of the modal particle "le"
Making a telephone call
Use of "jiu" and "cal" (Grammar portion)
Automobiles e.g. Bus, train, boat, car, bike etc.
Traveling, by train, by airplane, by bus, on the bike, by boat.. etc.

Module IV
The ordinal number "di"
"Mei" the demonstrative pronoun e.g. mei tian, mei nian etc.
use of to enter to exit
Structural particle "de" (Compliment of degree).
Going to the Park.
Description about class schedule during a week in school.
Grammar use of "li" and "cong".
Comprehension reading followed by questions.

Module V
Persuasion-Please don't smoke.
Please speak slowly
Praise – This pictorial is very beautiful
Opposites e.g. Clean-Dirty, Little-More, Old-New, Young-Old, Easy-Difficult, Boy-Girl, Black-White, Big-Small, Slow-Fast … etc.
Talking about studies and classmates
Use of "it doesn't matter"
Enquiring about a student, description about study method.
Grammar: Negation of a sentence with a verbal predicate.

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

Text & References:

- "Elementary Chinese Reader Part I, Part-2" Lesson 21-30

CHEMICAL TECHNOLOGY-II

Course code: BTH 401 **Credit units: 03**

Module-1

Petroleum and Petrochemical Industries: Origin and composition of petroleum, classification of petroleum, Manufacture of petroleum products and their uses and properties. Petroleum refining, physical and chemical conversion products, lubricating oils, petrochemical precursors, methane, olefines, acetylenes and aromatics.

Coal and Coal Chemicals: Types of coal, destructive distillation of coal, distillation of coal tar, chemicals from coal.

Module-2

Pulp and Paper Industries: Cellulose derivatives, pulp, paper and boards. Types of raw material for pulping, various pulping methods, recovery of chemicals from black liquor. Manufacture of paper, quality improvement of paper.

Soaps and Detergents: Types of soaps, soap manufacture, recovery and purification. Types of detergents, their cleansing action.

Surface Coating Industries: Paints, Pigments, Varnishes, Industrial coatings.

Module-3

Sugar and Starch Industries: Raw and refined sugar, byproducts of sugar industries, Starch and starch derivatives.

Food Industries: Food processing, Food additives and preservatives, food processing equipment's.

Fermentation and Enzyme Industries: Production of industrial alcohol, acetic acid, citric acid and lactic acid. Introduction to enzymes and their applications.

Oils and Fats: Types of oil, different fatty acids, extraction of oil from seeds, oil purification, hydrogenation of oil.

Module-4

Polymers: Monomers, Thermoplastic and Thermosetting materials (such as polythylene, polypropylene, polyvinyl chloride, polystyrene) and PF resins; Epoxy and polyesters - Natural rubber; Synthetic rubber such as SBR, NBR, CR - Fundamental methods of processing of synthetic Rubbers.

Pharmaceutical Industries: Introduction to pharmaceutical products - Synthesis and recovery,

Text Books:-

1. Rao, M.G. and, Sittig, M., Dryden's Outlines of Chemical Technology for the 21st century, Affiliated East West (1998) 3rd ed.
2. Austin, G.T., Shreve's Chemical Process Industries, McGraw Hill (1998) 5th ed.
3. Groggins, P.H., Unit Processes in Organic Synthesis, Tata McGraw Hill (2003) 5th ed.

Reference Book:-

1. Faith, W.L., Clark, R.L. and Keyes, D.B., Industrial Chemicals, John Wiley (1980) 4th ed.
2. Garry, James H., Handwerk, G. E. and Kaiser, M.J., Petroleum Refining Technology and Economics, Taylor & Francis (2007)

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

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

CHEMICAL ENGINEERING THERMODYNAMICS-I

Course code: BTH 402 **Credit units: 04**

Course Objective:

Objective of this course is to impart an understanding of the principles of thermodynamics and heat transfer. This course also helps students understand the application of, thermodynamics, and heat transfer principles and techniques, including the use of empirical data, to the analysis of representative fluid and thermal energy components and systems encountered in the practice of chemical engineering.

Course Contents:

Module I: Basic concepts
Thermodynamic system, intensive and extensive properties, cyclic process, Zeroth Law of Thermodynamics, Work and heat, Flow work, Conversion of heat into work by Power cycles-Refrigeration, Thermodynamic analysis of processes.

ModuleII: Applications of thermodynamics to flow processes
Thermodynamic properties of fluids and their inter relationships : PVT behaviour of pure substances , Equation of state, Generalized correlations and acentric factor, PVT behaviour of mixtures
Thermodynamic charts ; Estimation of thermodynamic properties

Module: III Solutions:
Partial molal properties , Chemical potential , Gibbs-Duhem equation, Ideal and non ideal solutions, Fugacity and fugacity coefficient, Activity and activity coefficient, Excess properties of mixtures.

Module IV: Phase Equilibria
General criterion for equilibrium and their application

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

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

Text Books :

- Nag, P.K "Engineering Thermodynamics", Tata McGraw Hill
- Hougen, O.A., Watson, K.M., and Ragatz, R.A., " Chemical Process Principles Part II " John Willy & Sons, (CBS Publishers & Distributors, New Delhi).

References:

- Engel, T. and Reid, P., Thermodynamics, Statistical Thermodynamics & Kinetics, Pearson Education, 2006
- Cengel & Boles, "Thermodynamics", Tata McGraw Hill.
- Sonntag /Vanhylene, Fundamentals of Thermodynamics, Wiley
- Kyle, B.G., " Chemical and Process Thermodynamics' , Prentice Hall, Inc
- Y.V.C. Rao, Engineering Thermodynamics, Khanna Publications
- Onkar Singh, Applied Thermodynamics, New Age Publications.

MECHANICAL OPERATIONS

Course code: BTH 403 Credit units: 04

Course Objective:

This course would impart an understanding that the industrial processes contain a coordinated series of separation operations and thus enable them decide the best technique for a particular process

Course Contents:

Module I: Particle Size and shape
Measurement and Analysis, screening and screen analysis, screen effectiveness, Design of industrial screening equipment., Size Reduction

Module II: Particle separation
Sedimentation, Free and hindered settling , Thickeners and settling chambers, characteristics of rotating fluids, Centrifuges, cyclone separators , bag filters, Electrostatic precipitator

Module III: Flow through porous media
Consatant pressure and constant rate filtration, Compressible and incompressible cakes, Filteration rate calculation, Filteration equipment

Module IV: Flow through packed bed
Packing materials and their characteristics, Bed porosity and packing area., Pressure drop, Flooding and loading .

Module V: Fluidization
Pressure drop and minimum fluidization , Liquid and gas fluidization velocity

Module VI: Solid handling
Storage of solids-bins, cellos, hoppers, Transport of solids-screw and belt conveyors, pneumatic and hydraulic transport, Mixing of solids and pastes.

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

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

Text Books:

- Brown, G.G.," Unit Operations" CBS Publishers & Distributors, New Delhi
- McCabe, W.L., Smith J.C. and Harriot, P.,, "Unit Operations in chemical engineering', Mcgraw-Hill Inc.

References:

- Coulson , J. M., and Richardson,J.F., 'Chemical Engineering, Volume 2", Pergamon Press.

DOMAIN ELECTIVE II
NUMERICAL ANALYSIS

Course Code: BTH 404 **Credit Units: 03**

Course Objective:
This course deals with the techniques of numerical analysis, which gives the solution to applied problem when ordinary analytical method fails. Emphasis is given on computer programming also so that the given techniques can be used in design of engineering and scientific problems.

Course Contents:

Module I: Solution of Algebraic and Transcendental Equation

Error in a series approximation, Bisection Method, Iteration method, Method of false position, Newton-Raphson method, **Solutions of Simultaneous equation**
Gauss elimination method, Jacobi iteration method, Gauss Seidal method

Module II: Interpolation
Finite Differences, Difference tables
Polynomial Interpolation**:** Newton's forward and backward formula
Central Difference Formulae: Gauss forward and backward formula.
Interpolation with unequal intervals: Lagrange's Interpolation, Newton Divided difference formula

Module III: Numerical Integration and Differentiation
Introduction, Numerical differentiation Numerical Integration: Trapezoidal rule, Simpson's 1/3 and 3/8 rules.

Module IV: Solution of differential Equations
Euler's Method, Runga-Kutta Methods.

Module V: Statistical Computation
Frequency chart, Curve fitting by method of least squares, fitting of straight lines, polynomials, exponential curves etc, Data fitting with Cubic splines.

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

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

Text & References:

Text:
- Rajaraman V, "Computer Oriented Numerical Methods", Pearson Education
- Gerald & Whealey, "Applied Numerical Analyses", AW
- Jain, Iyengar and Jain, "Numerical Methods for Scientific and Engineering Computations", New Age Int.
- Grewal B S, "Numerical methods in Engineering and Science", Khanna Publishers, Delhi

References:
- T Veerarajan, T Ramachandran, "Theory and Problems in Numerical Methods, TMH
- Pradip Niyogi, "Numerical Analysis and Algorithms", TMH
- Francis Scheld, " Numerical Analysis", TMH
- Sastry S. S, "Introductory Methods of Numerical Analysis", Pearson Education.
- Gupta C.B., Vijay Gupta, "Introduction to Statistical Methods", Vikas Publishing.
- Goyal, M, "Computer Based Numerical and Statistical Techniques", Firewall Media, New Delhi.

DOMAIN ELECTIVE-I I
CORROSION SCIENCE AND ENGINEERING

Course Code: BTH 405 **Credit Units: 04**

Course Contents:

Module I: Introduction to Corrosion Science and Engineering

Basic aspects introduction,classification, economics and cost of corrosion. Emf series, Galvanic series,corrosion theories derivation of potential- current relationship of activation controlled and diffusion corrosion processes. Potential- pH diagrams Fe-H2O system, application and limitations. Passivation definition, anodic Passivation, theory of Passivation, oxidation laws, effects of oxygen and alloying on oxidation rates.

Module II: Corrosion, Definition and Types

Forms of corrosion-definition, factors and control methods of various forms of corrosion such as pitting, inter granular, crevice, stress corrosion, corrosion fatigue, hydrogen embrittlement, corrosion processes and control methods in fertilizers, petrochemical and petroleum refineries

Module III: Environmental Aspects on Corrosion

Environmental aspects: Atmospheric corrosion- classification, factors influencing atmospheric corrosion,temporary corrosion preventive methods, corrosion in immersed condition, effect of dissolved gases, salts, pH, temperature and flow rates on corrosion, Underground corrosion- corrosion process in the soil, factors influencing soil corrosion.

Module IV: Corrosion Control

Corrosion control aspects: Electrochemical methods of protection-theory of cathodic protection, design of cathodic protection, sacrificial anodes, anodic protection. Corrosion inhibitors for acidic, neutral and alkaline media, cooling water system-boiler water system. Organic coating-surface preparation, natural synthetic resin, paint formulation and applications. Design aspects in corrosion prevention, corrosion resistant materials.

Module V: Corrosion Testing and Monitoring

Corrosion Testing, monitoring and inspection, laboratory corrosion tests, accelerated chemical tests for studying different forms of corrosion. Electrochemical methods of corrosion rate measurements by DC and AC methods, corrosions monitoring methods, chemical and electrochemical removal of corrosion products,

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

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

Text Book:

1. S.N. Banerjee, An Introduction to Corrosion and Corrosion Inhibition,Oxonian Press Ltd., New Delhi.

Reference Books:

1. LL Shrier Corrosion Vol. I & II George Nownons Ltd., Southampton Street London Endn. II
2. M.G. Fontana & N.D. Greene,Corrosion Engineering, McGraw Hill, New York (3/e)
5. Jain & Jain, Engineering Chemistry, Dhanpat Rai & Sons, New Delhi

CHEMICAL TECHNOLOGY LAB

Course Code: **BTH 421** **Credit Units: 1**

Course Contents:

List of Experiments:

1. Preparation of aspirin
2. Preparation of soap
3. Preparation of Methyl orange and Malachite green
4. Estimation of purity of Glycerol by dichromate method
5. Determination of acid value of an oil
6. Analysis of sugar
7. Analysis of urea
8. Determination of Calorific value of a fuel using Bomb calorimeter
9. Proximate analysis of fuel
10. Determination of aniline point of a given lubricant
11. Orsat analysis of flue gases

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	15	15	15	25	25

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

MECHANICAL OPERATION LAB

Course Code: BTH 423 **Credit Units: 01**

- To study the settling characteristics. (Free & Hindered settling) of a given suspension of particles.
- To study the filtration characteristics Plate and frame filter press.
- To carry out differential and cumulative screen analysis of given sample of solid particles.
- To study the pressure drop characteristics through packed beds.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	15	15	15	25	25

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

NUMERICAL ANALYSIS LAB

Course Code: BTH 424 **Credit Units: 01**

Use of following Techniques in C/C++ Language

1. Solution of single non-linear algebraic equations by Newton Raphson method.
2. Solution of single non-linear equations by Regular falsi method.
3. Solution of system of linear simultaneous by Gauss Elimination method.
4. Solution of system of linear simultaneous equation by gauss seidel method and successive over Relaxation method.
5. Solution of single first order ordinary differential equations by fourth order Runge-Kutta method.
6. Solution of Heat equations (Parabolic equations) by finite difference method.
7. Solution of Laplace equations (elliptic equation) by finite difference method.
8. Solution of wave equations (Hyperbolic equation) by finite difference method.
9. Finding Newton's interpolatory polynomial for n points.
10. Finding Newton's interpolatory polynomial based on finite difference table for n points.
11. Simpson's 3/8-rule.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	15	15	15	25	25

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

COMMUNICATION SKILLS - II

Course Code: BCS 401 **Credit Units: 01**

Course Objective:

To teach the participants strategies for improving academic reading and writing.
Emphasis is placed on increasing fluency, deepening vocabulary, and refining academic language proficiency.

Course Contents:

Module I: Social Communication Skills
Small Talk
Conversational English
Appropriateness
Building rapport

Module II: Context Based Speaking
In general situations
In specific professional situations
Discussion and associated vocabulary
Simulations/Role Play

Module III: Professional Skills
Presentations
Negotiations
Meetings
Telephony Skills

Examination Scheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage (%)	20	20	25	10	10	10	5

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

Text & References:

- Essential Telephoning in English, Garside/Garside, Cambridge
- Working in English, Jones, Cambridge
- Business Communication, Raman – Prakash, Oxford
- Speaking Personally, Porter-Ladousse, Cambridge
- Speaking Effectively, Jermy Comfort, et.al, Cambridge
- Business Communication, Raman – Prakash, Oxford

BEHAVIOURAL SCIENCE - IV
(RELATIONSHIP MANAGEMENT)

Course Code: BSS 404 **Credit Units: 01**

Course Objective:

To understand the basis of interpersonal relationship
To understand various communication style
To learn the strategies for effective interpersonal relationship

Course Contents:

Module I: Understanding Relationships
Importance of relationships
Role and relationships
Maintaining healthy relationships

Module II: Bridging Individual Differences
Understanding individual differences
Bridging differences in Interpersonal Relationship – TA
Communication Styles

Module III: Interpersonal Relationship Development
Importance of Interpersonal Relationships
Interpersonal Relationships Skills
Types of Interpersonal Relationships

Module IV: Theories of Interpersonal Relationships
Theories: Social Exchange, Uncertainty Reduction Theory
Factors Affecting Interpersonal Relationships
Improving Interpersonal Relationships

Module V: Impression Management
Meaning & Components of Impression Management
Impression Management Techniques (Influencing Skills)
Impression Management Training-Self help and Formal approaches

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:

- Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
- Julia T. Wood. Interpersonal Communication everyday encounter
- Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassell
- Goddard, Ken: Informative Writing, 1995 1st Edition, Cassell
- Harvard Business School, Effective Communication: United States of America
- Foster John, Effective Writing Skills: Volume-7, First Edition 2000, Institute of Public Relations (IPR)
- Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers.

FRENCH - IV

Course Code: FLT 401 **Credit Units: 02**

Course Objective:

To enable students:

- To develop strategies of comprehension of texts of different origin
- To present facts, projects, plans with precision

Course Contents:

Module C: pp. 104 – 139: Unités 8, 9

Contenu lexical: **Unité 8: Découvrir le passé**

1. parler du passé, des habitudes et des changements.
2. parler de la famille, raconter une suite d'événements/préciser leur date et leur durée.
3. connaître quelques moments de l'histoire

Unité 9: Entreprendre

1. faire un projet de la réalisation: (exprimer un besoin, préciser les étapes d'une réalisation)
2. parler d'une entreprise
2. parler du futur

Contenu grammatical:

1. Imparfait
2. Pronom « en »
3. Futur
4. Discours rapporté au présent
5. Passé récent
6. Présent progressif

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- le livre à suivre : Campus: Tome 1

GERMAN - IV

Course Code: FLG 401 Credit Units: 02

Course Objective:
To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany.
Introduction to Advanced Grammar Language and Professional Jargon

Course Contents:

Module I: Present perfect tense
Present perfect tense, usage and applicability
Usage of this tense to indicate near past
Universal applicability of this tense in German

Module II: Letter writing
To acquaint the students with the form of writing informal letters.

Module III: Interchanging prepositions
Usage of prepositions with both accusative and dative cases
Usage of verbs fixed with prepositions
Emphasizing on the action and position factor

Module IV: Past tense
Introduction to simple past tense
Learning the verb forms in past tense
Making a list of all verbs in the past tense and the participle forms

Module V: Reading a Fairy Tale
Comprehension and narration
- Rotkäppchen
- Froschprinzessin
- Die Fremdsprache

Module VI: Genitive case
Genitive case – Explain the concept of possession in genitive
Mentioning the structure of weak nouns

Module VII: Genitive prepositions
Discuss the genitive propositions and their usage: (während, wegen, statt, trotz)

Module VIII: Picture Description
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;
Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant - 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH - IV

Course Code: FLS 401 Credit Units: 02

Course Objective:

To enable students acquire working knowledge of the language; to give them vocabulary, grammar, voice modulations/intonations to handle everyday Spanish situations with ease.

Course Contents:

Module I
Revision of eaSrlier semester modules
Introduction to Present Continuous Tense (Gerunds)

Module II
Translation with Present Continuous Tense
Introduction to Gustar, Parecer, Apetecer, doler

Module III
Imperatives (positive and negative commands of regular verbs)

Module IV
Commercial/business vocabulary

Module V
Simple conversation with help of texts and vocabulary
En la recepcion del hotel
En el restaurante
En la agencia de viajes
En la tienda/supermercado

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español Sin Fronteras (Nivel – Elemental)

CHINESE – IV

Course Code: FLC 401 Credit Units: 02

Course Objective:
How many characters are there? The early Qing dynasty dictionary included nearly 50,000 characters the vast majority of which were rare accumulated characters over the centuries. An educate person in China can probably recognize around 6000 characters. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I
Dialogue Practice
Observe picture and answer the question
Pronunciation and intonation
Character writing and stroke order.
Electronic items

Module II
Traveling – The Scenery is very beautiful
Weather and climate
Grammar question with – "bu shi …. Ma?"
The construction "yao … le" (Used to indicate that an action is going to take place)
Time words "yiqian", "yiwai" (Before and after).
The adverb "geng".

Module III
Going to a friend house for a visit meeting his family and talking about their customs.
Fallen sick and going to the Doctor, the doctor examines, takes temperature and writes prescription.
Aspect particle "guo" shows that an action has happened some time in the past.
Progressive aspect of an actin "zhengzai" Also the use if "zhe" with it.
To welcome someone and to see off someone …. I cant go the airport to see you off… etc.

Module IV
Shipment. Is this the place to checking luggage?
Basic dialogue on – Where do u work?
Basic dialogue on – This is my address
Basic dialogue on – I understand Chinese
Basic dialogue on – What job do u do?
Basic dialogue on – What time is it now?

Module V
Basic dialogue on – What day (date) is it today?
Basic dialogue on – What is the weather like here.
Basic dialogue on – Do u like Chinese food?
Basic dialogue on – I am planning to go to China.

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader, Part-2" Lesson 31-38

CHEMICAL REACTION ENGINEERING – I

Course Code: BTH 501 Credit Units: 04

Course Contents:

Module I: Kinetics of homogeneous reactions:
Rate of reaction, Elementary and non-elementary homogeneous reactions, Molecularity and Order of reaction , Thermodynamic formulations of rates, Mechanism of reaction, Temperature dependency from thermodynamics , Arrhenius collision and activated complex theories.

Module II: Introduction to Batch Reactor:
Integral and differential methods for analyzing kinetic data, Interpretation of constant volume batch reactor, data for zero, first, second and third order reactions, Half life period, Irreversible reaction in parallel and series, Auto catalytic reaction.

Module III: Interpretation of Reactor Data:
Interpretation of variable volume batch reactions data for zero, first and second order reactions, Design equations for batch, plug flow, back mix flow and semi batch reactors for isothermal, adiabatic homogeneous reaction.

Module IV: Introduction to Reactor Design:
Holding time and space-time for flow system, Design of batch, plug flow and mixed flow reactors for first and second order single reactions, Optimum reactor size, Plug flow reactors in series/parallel. Equal and different size of mixed reactors in series and finding the best system for the given conversion, Recycle reactor, Design of reactors for multiple reactions, parallel and series reaction, series-parallel reactions.

Module V: Compartment Models:
Temperature and pressure effects for single reaction, Optimal temperature progression for first order reactions. Residence time distribution of fluid in vessels, E , F and C curve, Dispersion models, Tanks in series model.

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

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

Text Books

1.Levenspiel, O.. “Chemical Reaction Engineering”, 3rd ed. New York John Wiley (1998)

Reference Books

1. Fogler, H.S. “Elements of Chemical Reaction Engineering”, 4th ed. Prentice Hall (1997).
2. Smith, J. “Chemical Engineering Kinetics “, 3rd edition. McGraw-Hill, . (1990).

CHEMICAL ENGINEERING THERMODYNAMICS-II

Course Code: BTH 502 Credit Units: 04

Course Contents:

Module I: Review of Basic Concepts

The first law and conservation of energy. Applications to steady , non-steady flow and other engineering problems. The second law, Applications to engineering problems relating to equilibrium, maximum and minimum work.

Module II: Properties of Pure Substances

Changes in thermodynamic properties and their inter-relationships. The ideal gas. Fugacity and Fugacity coefficients for real gases.

Module III: Multicomponent System

Partial molal properties. Mathematical models for the chemical potential. Ideal and non-ideal solutions. Activity and activity coefficients. The Gibbs Duhem equations. Excess properties of mixtures.

Module IV: Chemical Reaction Equilibrium

Chemical equilibrium in homogenous and heterogeneous chemical reactions. Combined chemical and phase equilibrium. Balance equation for Tank-type and Tubular reactors.

Module V: Thermodynamic Analysis of Processes

Work and energy functions, availability, heat exchange, mixing and separation processes.

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

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

Text Books :

1. Smith, J.M., Van Ness, H.C. & Abbot, M.M. “Intro to Chemical Engineering
2. Nag, P.K “Engineering Thermodynamics”, Tata McGraw Hill

References:

1. Engel, T. and Reid, P., Thermodynamics, Statistical Thermodynamics & Kinetics, Pearson Education, 2006
2. Cengel & Boles, “Thermodynamics”, Tata McGraw Hill.
3. Sonntag /Vanhylene, Fundamentals of Thermodynamics, Wiley
4. Kyle, B.G., “ Chemical and Process Thermodynamics’ , Prentice Hall, Inc
5. Y.V.C. Rao, Engineering Thermodynamics, Khanna Publications

HEAT TRANSFER

Course Code: BTH 503 Credit Units: 04

Course Contents:

Module I: Introduction and Conduction

Introduction to heat transfer and general concepts of heat transfer by conduction, convection and radiation. Conduction: Basic concepts of conduction in solids, liquids and gases, steady state temperature fields and one dimensional conduction without heat generation, e.g., through plane walls, cylindrical and spherical surfaces, composite layers, etc. Insulation materials, critical and optimum insulation thickness, Extended surfaces, fins and their practical applications. Introduction to unsteady state heat transfer.

Module II: Convection

Fundamentals of convection, Basic concepts and definitions, natural and forced convection, hydrodynamic and thermal boundary layers, laminar and turbulent heat transfer inside and outside tubes, Dimensional analysis, determination of individual and overall heat transfer coefficients and their temperature dependence, heat transfer in molten metals.

Module III: Radiation

Basic laws of heat transfer by radiation, black body and gray body concepts, view factors, Kirchoff'ssz law, solar radiations, combined heat transfer coefficients by convection and radiation.

Module IV: Heat Transfer with Phase Change

Condensation of pure and mixed vapors, film wise and drop wise condensation, loading in condensers and basic calculation on condensers, heat transfer in boiling liquids, boiling heat transfer coefficients. Evaporation: Elementary principles, types of evaporators. Single and multiple effect evaporators and their calculation, thermo compression.

Module V: Heat Transfer Equipment

Classification, principles and design criteria, types of exchangers, viz., double pipe, shell and tube, plate type, extended surface, Furnaces and their classification and application.

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

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

Text Books

Holman, J.P.: "Heat Transfer" 9 th ed. McGraw Hill (1989).

MASS TRANSFER – I

Course Code: BTH 504 Credit Units: 04

Course Contents:

Module I: Diffusion

Molecular and turbulent diffusion, diffusion coefficient, Fick's Law of diffusion, Dependence of diffusion coefficient on temperature, pressure and composition; measurement and estimation of diffusivity. Diffusion in multi-component gas mixtures. Diffusion in Solids: Molecular, Knudsen & surface diffusion; Inter- phase mass transfer: Mass transfer coefficients, Diffusion between phases, Equilibrium solubility of gases in liquids, Mass transfer theories, Mass transfer in fluidized beds, Flow past solids and boundary layers, Simultaneous heat and mass transfer.

Module II: Absorption and Stripping

Equipments, Gas-liquid equilibrium, Henry's law, Selection of solvent, Absorption in tray column, Graphical and analytical methods, Absorption in packed columns, HTU, NTU &HETP concepts, Design equations for packed column, Absorption with chemical reaction and mass transfer.

Module III: Humidification and Dehumidification

Vapour liquid equilibrium and enthalpy for a pure substance, vapour pressure temperature curve, Vapour gas mixtures, Definition and derivations of relationships related with humidity Fundamental concept of humidification, Dehumidification and water cooling, Wet bulb temperature, Adiabatic and non-adiabatic operations, Evaporative cooling ,Classification and design of cooling towers.

Module IV: Drying

Solid-gas equilibrium, Different modes of drying operations, Definitions of moisture contents, Types of batch and continuous dryers, Rate of batch drying, Time of drying, Mechanism of batch drying, Continuous drying, Design of continuous dryers.

Module V: Crystallization

Equilibrium yield of crystallization Heat and mass transfer rates in crystallization, Theories of crystallization, Factors governing nucleation and crystal growth rates, Controlled growth of crystal., Classification and design of crystallizers.

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

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

Text Books

1. Treybal, R "Mass Transfer Operations", 3rd ed. New York: McGraw-Hill, (1980).
2. Sherwood T. K., Pigford R. L. and ilke P. "Mass Transfer" McGraw Hill (1975).

Reference Books

1. Foust A. S. et.al., "Principles of Unit Operations" John Wiley (1980).
2. Geankoplis, C.J.. "Transport Processes and Unit Operations", 3rd ed. Prentice Hall. (1993)

WEB DEVELOPMENT

Course Code: BCS 510 **Credit Units: 03**

Course Objective:

To design web base and context aware systems to acquire, organize process, share and use the knowledge of web sites. The field of web site is multidisciplinary as web sites are amazingly complex systems. The major objective of this course is to provide a sound foundation to the students on the concepts, percepts and practices in a field that is of immense concern to the industry and business.

Course Contents:

Module I: Overview of Internet

Introduction to Internet and WWW, Concept of Networking and Layers of OSI Model, Internet protocols like TCP/IP, http, telnet and ftp, URL, email, domain name, Web Browsers.

Module II: Principles of Web Design

Key issues to be considered in web site design. Structure of a Web Page: Introduction to HTML, Elements of HTML syntax, Head and Body sections, Building HTML documents, Inserting text, images, hyperlinks, Backgrounds and Color Control, HTML Editors & Tools: Use of different HTML editors and tools like Netscape Communicator and Microsoft Front Page etc

Module III: HTML Tags

Use of Different HTML tags in web pages. Table Handling: Table layout & presentation, constructing tables in a web page, developing a web page in a table. Ordered and unordered lists. Frames: Developing Web pages using frames. Advantages and disadvantages of frames. Creating forms, Role of Databases in web applications. Use of at least one graphical and animation tools like Adobe Fireworks, Abode Photoshop, Gif Animator, Gimp etc.

Module IV: Cascading style-sheet (CSS) in HTML

Introduction to Cascading Style Sheets (CSS), Types of Style Sheets (Inline, Internal and External), CSS for Website Layout and Print Layout.

Types of various CSS Selectors, CSS properties: Type Properties, Background Properties, Block Properties, Box Model Properties, List Properties, Border Properties, Positioning Propeties.

Module V: Introduction to Java Script

Role of java script in a web page, Script writing basics, Adding interactivity to a web page, creating dynamic web pages,

Similarities to java, embedding JavaScript code, embedding java applets in a web page**,** Form validation using java script

Projects:

Creating a discussion form, creating an online store, creating a job site.

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

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

Text & References:

Text:

- Ramesh Bangia, "Web Technology", Firewall media
- C. Xavier, "World Wide Web Design with HTML", Tata McGraw Hill.
- Unleashed ASP, Techmedia

References:

- Rick Dranell, "HTML4 unleashed", Techmedia Publication.
- Shelly Powers, "Dynamic Web Publishing Unleashed", Techmedia.
- Don Gosselin, "JavaScript", Vikas Publication
    - Mark Swank & Drew Kittel, "World Wide Web Database", Sams net.

DOMAIN ELECTIVE-III
PROCESS INSTRUMENTATION

Course Code: BTH 505 Credit Units: 03

Course Contents:

Module I: Introduction of Instruments

Importance of measuring of Instruments in Process Control, Classification of Instruments, Elements of an Instruments, Static & Dynamic Characterization of Instruments, Errors in measurements & Error Analysis, Selection of instrument for a particular Measurement, transducers.

Module II: Temperature sensing devices

Measurement of Temperature: Thermocouples, Resistance Thermometer, Expansion Thermometers, Pyrometers.

Module III: Pressure measuring instruments

Measurement of Pressure & Vacuum, Hydrostatic type, Elastic Element type, Electrical Type and other type of instruments like Neleod Gauge, Thermocouple gauge, Knudson Gauge, Ionization Gauge.

Module IV: Introduction to flow measuring instruments

Instruments for Measurement of Flow rate, level & Viscosity, Variable Area & variable head flow meters, Volumetric and Mass flow rate meters, Linear velocity measurement systems, Anemometers, Pressure type , Resistance & Capacitance type, Sonic & Ultrasonic, Thermal type Level meters. Viscometers: Redwood, Saybolt, Engler, Cup & Cone type, Rheo & other types of viscometers.

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

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

Books

1. Eckman, D.P., Industrial Instrumentation, Wiley Eastern Ltd., New York 1990.

2. Jain, R.K., Mechanical and Industrial Measurements, Khanna Publishers.

DOMAIN ELECTIVE-III

PIPING DESIGN

Course Code: **BTH 506** **Credit Units: 03**

Course Contents:

Module 1: Introduction: - Introduction to Piping - Responsibilities of Piping Engineer and Designer - Scope of Piping, General: Process Diagrams (PFD, UFD, P&ID, Line List etc.) , Piping Fundamentals: - Definition Application - Codes and Standards

Module 2: Pipe Fittings, Pipe Flanges, Valves, Piping Special Items, Process Mechanical Equipments - Static equipments - Rotary equipments

Module 3: Layouts: - Preparation of Plot Plan - Preparation of Equipment Layouts - Preparation of Nozzle Orientation Drawings - Preparation of Piping General Arrangement Drawings - Preparation of Cross Sectional Drawings 10. Piping Isometric Drawings

Module 4: Pipe Supports: - Types of support - Support Selection - Support Location - Support Span Charts, Materials: - Reading Piping Material Specification - Basic material knowhow, Stress: - Types of Loop - Line flexibility, Typical piping configuration for commonly used equipments.

Examination Scheme: –

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

Text Book:

1- Sahu G.K., Handbook of Piping Design, New Age International Publisher
2- Hunt Roger, Bausbacher Ed, Process Plant Layout and Piping Design, Pearson Prentice Hall

CHEMICAL REACTION ENGINEERING LAB

Course Code: BTH 521 **Credit Units: 01**

1. To determine the relative rates of reaction of iodide ion with hydrogen peroxide at room temperature using different concentrations of the iodide ion.
2. To separate Organic Compounds by Paper Chromatography.
3. To study the effect of temperature, concentration of the reactants and a catalyst on the rate of chemical reaction
4. To study the activity results or oxidation-reduction replacement reaction.
5. To purify water by ion -exchange.
6. To determine the order and rate constant of esterification reaction at room temperature.
7. To determine the order and rate constant of saponification reaction at room temperature.
8. To study the residence time distribution (R.T.D.) in a stirred tank reactor.
9. To study the residence time distribution (R.T.D.) in a plug flow reactor.
10. To study the decomposition of calcium carbonate
11. To determine the energy of activation of a given chemical reaction.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	15	15	15	25	25

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

HEAT TRANSFER LAB

Course code: BTH 523 **Credit Units: 01**

1. To find the thermal conductivity of metallic rod at different temperature and draw the temperature profile for steady and unsteady state conduction.
2. To find out the thermal conductivity of insulating powder.
3. To find the thermal conductivity of liquid / gases.
4. To find the emissivity of grey plate with respect to black plate
5. To study the critical heat flux behavior of a liquid
6. To find the heat transfer coefficient for parallel and counter current flow condition for a Double pipe Heat exchanger
7. To study the shell & Tube heat exchanger and find the heat duty and Over all heat transfer coefficient for parallel flow condition.
8. To study the shell & Tube heat exchanger and find the heat duty and Over all heat transfer coefficient for counter flow condition.
9. Compare the heat duty for parallel &Counter flow and find the energy saving.
10. To study the Plate heat exchanger and find the Overall heat transfer coefficient
11. To study the performance of heat pipe.
12. To find the heat transfer coefficient for open pan evaporator for steady and unsteady state condition.
13. To study Single/Double/Triple effect Evaporator and find its Steam economy

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	15	15	15	25	25

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

WEB WEVELOPMENT LAB

Course Code: **BCS 530** **Credit Units: 01**

Software Required: Java

List of Assignment:

1. Design a HTML page using all the basic tags.
2. Design a page containing your educational qualification in a table.
3. Design a page containing an ordered list/unordered list.
4. Design a HTML page for your resume.
5. Design a form in HTML to enter different attribute of student information.
6. Design a home page for ASE using Frame.
7. Design another page and connect these to the home page.
8. Write a function in Javascript for input validation.
9. Write a function in Javascript to calculate monthly installation of the loan.
10. Write an input form and save its data in a database using ASP.
11. Display the data stored in database in tabular form on the page.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	15	15	15	25	25

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

COMMUNICATION SKILLS - III

Course Code: BCS 501 **Credit Units: 01**

Course Objective:

To equip the participant with linguistic skills required in the field of science and technology while guiding them to excel in their academic field.

Course Contents:

Module I
Reading Comprehension
Summarising
Paraphrasing

Module II
Essay Writing
Dialogue Report

Module III
Writing Emails
Brochure
Leaflets

Module IV: Introduction to Phonetics
Vowels
Consonants
Accent and Rhythm
Accent Neutralization
Spoken English and Listening Practice

Examination Scheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage (%)	20	20	25	10	10	10	5

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

Text & References:

- Effective English for Engineering Students, B Cauveri, Macmillan India
- Creative English for Communication, Krishnaswamy N, Macmillan
- A Textbook of English Phonetics, Balasubramanian T, Macmillan

BEHAVIOURAL SCIENCE - V
(GROUP DYNAMICS AND TEAM BUILDING)

Course Code: BSS 504 **Credit Units: 01**

Course Objective:

To inculcate in the students an elementary level of understanding of group/team functions
To develop team spirit and to know the importance of working in teams

Course Contents:

Module I: Group formation
Definition and Characteristics
Importance of groups
Classification of groups
Stages of group formation
Benefits of group formation

Module II: Group Functions
External Conditions affecting group functioning: Authority, Structure, Org. Resources, Organizational policies etc.
Internal conditions affecting group functioning: Roles, Norms, Conformity, Status, Cohesiveness, Size, Inter group conflict.
Group Cohesiveness and Group Conflict
Adjustment in Groups

Module III: Teams
Meaning and nature of teams
External and internal factors effecting team
Building Effective Teams
Consensus Building
Collaboration

Module IV: Leadership
Meaning, Nature and Functions
Self leadership
Leadership styles in organization
Leadership in Teams

Module V: Power to empower: Individual and Teams
Meaning and Nature
Types of power
Relevance in organization and Society

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:

- Organizational Behaviour, Davis, K.
- Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
- Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressers, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.

FRENCH - V

Course Code: FLT 501 **Credit Units: 02**

Course Objective:

To furnish some basic knowledge of French culture and civilization for understanding an authentic document and information relating to political and administrative life.

Course Contents:

Module D: pp. 131 – 156 Unités 10, 11

Contenu lexical:

Unité 10: Prendre des décisions

1. Faire des comparaisons
2. décrire un lieu, le temps, les gens, l'ambiance
3. rédiger une carte postale

Unité 11: faire face aux problèmes

1. Exposer un problème.
2. parler de la santé, de la maladie
3. interdire/demander/donner une autorisation
4. connaître la vie politique française

Contenu grammatical:

1. comparatif - comparer des qualités/ quantités/actions
2. supposition : Si + présent, futur
3. adverbe - caractériser une action
4. pronom "Y"

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- le livre à suivre : Campus: Tome 1

GERMAN - V

Course Code: FLG 501 **Credit Units: 02**

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany
Introduction to Advanced Grammar and Business Language and Professional Jargon

Course Contents:

Module I: Genitive case
Genitive case – Explain the concept of possession in genitive
Mentioning the structure of weak nouns

Module II: Genitive prepositions
Discuss the genitive propositions and their usage: (während, wegen, statt, trotz)

Module III: Reflexive verbs
Verbs with accusative case
Verbs with dative case
Difference in usage in the two cases

Module IV: Verbs with fixed prepositions
Verbs with accusative case
Verbs with dative case
Difference in the usage of the two cases

Module V: Texts
A poem 'Maxi'
A text Rocko

Module VI: Picture Description
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;
Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant - 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH - V

Course Code: FLS 501 **Credit Units: 02**

Course Objective:

To enable students acquire working knowledge of the language; to give them vocabulary, grammar, voice modulations/intonations to handle everyday Spanish situations with ease.

Course Contents:

Module I
Revision of earlier semester modules

Module II
Future Tense

Module III
Presentations in English on
Spanish speaking countries'
Culture
Sports
Food
People
Politics
Society
Geography

Module IV
Situations:
En el hospital
En la comisaria
En la estacion de autobus/tren
En el banco/cambio

Module V
General revision of Spanish language learnt so far.

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español Sin Fronteras, Greenfield

CHINESE – V

Course Code: FLC 501 Credit Units: 02

Course Objective:

What English words come from Chinese? Some of the more common English words with Chinese roots areginseng, silk, dim sum, fengshui, typhoon, yin and yang, T'al chi, kung-fu. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I
Drills
Dialogue practice
Observe picture and answer the question.
Pronunciation and intonation.
Character writing and stroke order

Module II
Intonation
Chinese foods and tastes – tofu, chowmian, noodle, Beijing duck, rice, sweet, sour….etc. Learning to say phrases like – Chinese food, Western food, delicious, hot and spicy, sour, salty, tasteless, tender, nutritious, god for health, fish, shrimps, vegetables, cholesterol is not high, pizza, milk, vitamins, to be able to cook, to be used to, cook well, once a week, once a month, once a year, twice a week……
Repetition of the grammar and verbs taught in the previous module and making dialogues usingit.
Compliment of degree "de".

Module III
Grammar the complex sentence "suiran … danshi…."
Comparison – It is colder today than it was yesterday…..etc.
The Expression "chule….yiwai". (Besides)
Names of different animals.
Talking about Great Wall of China
Short stories

Module IV
Use of "huozhe" and "haishi"
Is he/she married?
Going for a film with a friend.
Having a meal at the restaurant and ordering a meal.

Module V
Shopping – Talking abut a thing you have bought, how much money you spent on it? How many kinds were there? What did you think of others?
Talking about a day in your life using compliment of degree "de". When you get up? When do you go for class? Do you sleep early or late? How is Chinese? Do you enjoy your life in the hostel?
Making up a dialogue by asking question on the year, month, day and the days of the week and answer them.

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- "Elementary Chinese Reader " Part-II Lesson 39-46

PRACTICAL TRAINING

Course Code: BTH 550 **Credit Units: 03**

Methodology

Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

Examination Scheme:

Feedback from industry/work place	30
Training Report	30
Viva	15
Presentation	25
Total	**100**

PROCESS DYNAMICS AND CONTROL

Course Code: BTH 601 Credit Units: 03

Course Contents:

Module I: Introduction to control systems

Introduction to Process control systems, Regulator & Servo control, Feed Forward & Feed backward control, Negative & Positive Feed back Control, variables & Physical Elements of a Control system, Physical, Block & Signal Flow Diagram. Use of Laplace & Inverse Laplace Transformation is study of Process Dynamics.

Module II: First Order Systems

Dynamic Modeling of a Process, Dynamic behavior of First order systems and First order systems in series. Dynamic behavior of second & higher order system for various kind of inputs, Linearization of nonlinear system, Transportation & Transfer Lag.

Module III: Introduction To Controller systems

Modes of control action, Controllers & Final control Elements, Reduction of Block & Signal Flow Diagrams, Closed loop transfer function and response of closed loop control system for various type of control actions.

Module IV: Stability of Controller Systems

Stability analysis, Rouths criterion, Root locus Analysis, Frequency Response Analysis & Design of Controllers for optimum Performance.

Module V: Advanced Controller Systems

Advanced control strategies, cascade control, Feed forward control, Tuning Rules for Feed Forward & Feed backward control, Ratio control, optimum controller Tuning, Ziegler Nichol & Cohen Coon settings.

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

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

Text Book

1. Process system Analysis & Control, D.R. Coughanoowr, McGraw Hill Publication.

Reference Books

1. Process Control. Peter Harriot, Tata McGraw Hill.
2. Process control, Staphno polies, Prentic Hall India Ltd.

CHEMICAL REACTION ENGINEERING – II

Course Code: BTH 602 **Credit Units: 03**

Course Contents:

Module I: Reactor Models

Design equations for batch, continuous and semi batch reactors, Selectivity and yield. Non-catalytic heterogeneous reactions ; Rate equations for heterogeneous reactions.

Module II: Heterogeneous Catalysis

Nature of catalysis, Adsorption isotherms, Mechanism of catalytic reactions, Physical properties of solid catalysts. Preparation testing and characterization of catalysts, Catalyst selection, Catalyst poisoning.

Module III: External Transport Process

Reaction and diffusion within porous catalysts, Effective diffusivity, Thermal conductivity and effectiveness factor. Reactor choice for single and multiple reactor system and recycle reactor Stability of Reactors ,Non - isothermal design of ideal reactor, Hot spot in tubular reactor, Steady state multiplicity and effect of operating variables on the stability of C.S.T.R.

Module IV: Reactor Design

Progressive conversion and un-reacted core model, Determination of rate controlling step, application to design, fluidized bed reactions Design of solid catalytic reactor, batch, CSTR and tubular reactor. Design of fixed bed and fluidized bed reactors.

Module V: Non elementary reactions and reactor design

Biochemical reaction system, Enzyme, Fermentation, Microbial fermentation, polymerization reactors

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

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

Text Book

1.Levenspiel, O.. “Chemical Reaction Engineering”, 3rd ed. New York John Wiley (1998)

Reference Books

1. Fogler, H.S. “Elements of Chemical Reaction Engineering”, 4th ed. Prentice Hall (1997).
2. Smith, J. “Chemical Engineering Kinetics “, 3rd edition. McGraw-Hill, . (1990).

MASS TRANSFER --II

Course Code: BTH 603 Credit Units: 04

Course Contents:

Module I: Distillation
Pressure-composition, Temperature-concentration, Enthalpy-concentration diagrams for ideal and non-ideal solutions, Raoults law and its application, Maximum and minimum boiling mixtures, concept of relative volatility, Single Stage Distillation Differential distillation, Flash vaporization, Vacuum, molecular and steam distillation.

Module II: Continuous Distillation of Binary Mixtures

Multistage contact operations, Characteristics of multistage tower, McCabe Thiele method, Ponchon Savarit method, Reflux, maximum, min. and optimum reflux, Use of open steam, Tray efficiency, Determination of height and column diameter, Multistage batch distillation; Principles of azeotropic and extractive distillation, Introduction to multicomponent distillation system.

Module III: Liquid-Liquid Extraction

Ternary liquid equilibria, Triangular graphical representation concept of theoretical or ideal stage, Equipment used for single stage and multistage continuous operation; Analytical and graphical solution of single and multistage operation Super critical fluid extraction.

Module IV: Solid /Liquid Extraction

Leaching, Solid liquid equilibrium, Equipment used in solid-liquid extraction,Single and multistage cross current contact and counter current operations. Concept of an ideal stage, Overall stage efficiency, Determination of number of stages.

Module V: Adsorption

Description of adsorption processes and their application, Types of adsorption, Nature of adsorbents adsorption equilibria and adsorption hysterises, Stage wise and continuous contact adsorption operations, Determination of number of stages, Equipments; Ion exchange, Equilibrium relationship, Principle of ion-exchange, techniques and applications, Principles and application of dialysis, osmosis reverse osmosis, thermal diffusion, sweep diffusion.

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

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

Text Books
1. Treybal, R "Mass Transfer Operations", 3rd ed. New York: McGraw-Hill, (1980).
2. Sherwood T. K., Pigford R. L. and Wilke P. "Mass Transfer" McGraw Hill (1975).

Reference Books
1. Foust A. S. et.al., "Principles of Unit Operations" John Wiley (1980).
2. Geankoplis, C.J.. "Transport Processes and Unit Operations", 3rd ed. Prentice Hall. (1993)

EQUIPMENT DESIGN

Course Code: BTH 604 Credit Units: 03

Course Contents:

Module I: Introduction to construction materials

Introduction to various mechanical properties of materials to be used as material of construction, resistance of metals to corrosion under varying conditions of temperature and pressure etc. Application and use of various codes and standards in design.

Module II: Designing of process equipments I

Design of non-pressure storage vessel, tall vertical vessels, unfired pressure vessels with internal pressure ,Design of unfired pressure vessels with external pressures, end closures, flat plates, domed ends, torispherical, ellipsoidal, hemispherical and conical ends. Design of nozzles,openings and reinforcements, Bolts, flanges, gaskets .

Module III: Design of process equipments II

Bolted flanges, pipe line design and process design of a few equipments like heat exchangers, Evaporators, Distillation columns, Absorbers, Reactors and Dryers .

Module IV: Mechanical designs of process equipments:
Mechanical design of selected process equipments such as heat exchangers, Evaporators,

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

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

Text Books:

1. Peters Max. S., Timmerhaus Klaus D.and Ronald E West “Plant Design and Economics for Chemical Engineers”.2003 V Edition McGraw Hill.
2. Coulson, J. M. and Richardson J. F. “Chemical Engineering”, vol. 6 Pargamon Press.(1989).
3. Brownel and Young, “Process Equipment Design ”.Wiley (1968).

Reference Books

1. Indian and American Codes Used in Designing of equipments (TEMA and IS Codes)
2. Evans, F. L., “Equipment Design Handbook”, Gulf Publishing Company.(1979).

ENVIRONMENTAL POLLUTION AND CONTROL

Course Code: BTH 605 Credit Units: 02

Course Contents:

Module I: Introduction

Environment and environmental pollution from chemical process industries, characterization of emission and effluents, environmental Laws and rules, standards for ambient air, noise emission and effluents

Module II: Pollution Prevention

Process modification, alternative raw material, recovery of by co-product from industrial emission effluents, recycle and reuse of waste, energy recovery and waste utilization. Material and energy balance for pollution minimization. Water use minimization, Fugitive emission/effluents and leakages and their control-housekeeping and maintenance.

Module III: Air and Water Pollution Control

Air Particulate emission control by mechanical separation and electrostatic precipitation, wet gas scrubbing, gaseous emission control by adsorption and adsorption, Design of cyclones, ESP, fabric filters and absorbers. Water Physical treatment, pre-treatment, solids removal by setting and sedimentation, filtration centrifugation, coagulation and flocculation.

Module IV: Chemical Treatment

Anaerobic and aerobic treatment biochemical kinetics, trickling filter, activated sludge and lagoons, aeration systems, sludge separation and drying

Module V: Waste management

Characterization of wastes-hazardous and non-hazardous wastes. Waste disposal and management laws and guidelines. Non-hazardous industrial wastes-treatment, disposal, utilization and management. Value-extraction from the wastes. Handling, storage and disposal of hazardous wastes. Case studies of a few real scenarios of waste management – sugar, pulp and paper, and fertilizer units.

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

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

Suggested Books:

1. Pollution Control Acts, Rules and Notifications, CPCB, Delhi. 1995
2. Vallero D., “Fundamentals of Air Pollution”, 4th Ed., Academic Press, 2007
3. Eckenfelder W. W., “Industrial Water Pollution Control”, 2nd Ed., Mc Graw Hill, 1999
4. Kreith F. and Tchobanoglous G., “Handbook of Solid Waste Management”, 2nd Ed., Mc Graw Hill,2002
5. Pichtel J., “Waste Management Practices: Municipal, Hazardous and Industrial”, CRC, 2005
6. Conway R.A. & Ross R.D., “Handbook of Industrial Waste Disposal”, Van-Nostrand Reinhold, 1980
7. Tchobanoglous G., Theisen H. & Vigil S.A., “Integrated Solid Waste Management : Engineering Principles and Management Issues”, McGraw Hill, 1993

PROGRAMMING WITH PYTHON

Course Code: BCS 610 **Credit Units: 03**

Course Objective:

Objective: Python is next generation multi-purpose programming language that allows different users to create applications of various domains. Students will be able to learn primary fundamentals of python programming and potential of python is to achieve modern computing requirements

Course Outcomes: After completion of this course, student will be able to

- To learn basics of Python.
- To develop console application in python.
- To develop database application in python.
- To develop basic machine learning application.

Pre-requisite of course: Object oriented concepts, Programming fundamentals

Course Contents:

Module I: Basic of Python Programming

The concept of data types; variables, assignments; immutable variables; numerical types; arithmetic operators and expressions; comments in the program; understanding error messages.

Module II: Conditioning and looping in python

Conditions, Boolean logic, logical operators; ranges; Control statements: if-else, loops (for, while); lambda function in python.

Module III: String, List, Tuple, Set, Dictionary data structure

String manipulations: subscript operator, indexing, slicing a string; strings and number system: converting strings to numbers and vice versa. Lists, tuples, and dictionaries; basic list operators, replacing, inserting, removing an element; searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values, traversing dictionaries.

Module IV: Function

Design with functions: hiding redundancy, complexity; arguments and return values; formal vs actual arguments, named arguments. Program structure and design. Recursive functions.

Module V: Basic Python Libraries

Pandas: creation of dataframe, Manipulation of dataframe, generation of series, iloc and loc function etc. NumPy: creation of arrays (1-D, 2-D and n-D array), random matrix, one's matrix, zero's matrix and all other operation over arrays, matplotlib: plotting of line graph, pi chart and box plot etc.

Projects:
Creating a discussion form, creating an online store, creating a job site.

Examination Scheme:

Components	A	CT	S/V/Q	HA	EE
Weightage (%)	5	15	15	15	50

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

Text & References:

Text:

- Ramesh Bangia, "Web Technology", Firewall media
- C. Xavier, "World Wide Web Design with HTML", Tata McGraw Hill.
- Unleashed ASP, Techmedia

References:

- Rick Dranell, "HTML4 unleashed", Techmedia Publication.
- Shelly Powers, "Dynamic Web Publishing Unleashed", Techmedia.
- Don Gosselin, "JavaScript", Vikas Publication
    - Mark Swank & Drew Kittel, "World Wide Web Database", Sams net.

PROCESS DYNAMICS & CONTROL LAB

Course Code: BTH 621 **Credit Units: 01**

Course Contents:

1. To study the response, time constant of thermocouple/ bimetallic thermometer.
2. To study the response of a liquid level tank system
3. To study the response of a two tank non-interacting system
4. To study the response of a two tank interacting system.
5. To study the response of a stirred tank heater system
6. To study the characteristics of an on-off controller.
7. To study the characteristics of a PI/PID pneumatic / electronic controller.
8. To study the performance of a closed loop control system containing controller,final control element, measuring element.
9. Calibration of temperature and pressure measuring instruments
10. Analysis of solution by UV/VIS spectrophotometer

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	15	15	15	25	25

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

MASS TRANSFER LAB

Course Code : BTH 623 **Credit Units: 01**

1. Study the performance and determination of Equilibrium relationships
2. Mass transfer coefficients,
3. Diffusion coefficients,
4. Separation factors of the experiments with differential distillation,
5. Flash vaporization, vapor liquid equilibrium,
6. Liquid – liquid extraction,
7. Solid –liquid extraction
8. Ion exchange and membrane separation.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	15	15	15	25	25

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

ENVIRONMENTAL POLLUTION and CONTROL LAB

Course Code: BTH 625 **Credit Units: 01**

1. Determination of Alkalinity in the water sample.
2. Determination of dissolved oxygen (DO) in the water sample.
3. Determination of Biological Oxygen Demand in the water sample.
4. Determination of chemical oxygen demand in the water sample.
5. Determination of turbidity in the water sample.
6. Determination of residual chlorine in the water sample.
7. Determination of pH and conductivity of sludge/water samples.
8. Determination of moisture content of sludge sample.
9. Determination of Total dissolved solids in water / effluent sample.
10. To conduct the Jar Test and also evaluate the coagulation efficiency.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	15	15	15	25	25

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

PROGRAMMING WITH PYTHON LAB

Course Code: BCS630 **Credit Units: 01**

Software Required: Java

List of Assignment:

1. Write a program to demonstrate basic data type in python.
2. Write a program to compute distance between two points taking input from the user.
3. Write a program add.py that takes 2 numbers as command line arguments and prints its sum.
4. Write a Program for checking whether the given number is an even number or not. Using a for loop, write a program that prints out the decimal equivalents of1/2, 1/3, 1/4, . . . , 1/10.
5. Write a Program to demonstrate list and tuple in python.
6. Write a program using for loop that loops over a sequence.
7. Write a program using a while loop that asks the user for a number, and print countdown from that number to zero
8. WAP to find the sum of the even-valued terms.
9. Write a program to count the numbers of characters in the string and store them in a dictionary data structure.
10. Write a program to use split and join methods in the string and trace a birthday of a person with a dictionary data structure.
11. Write a program to print each line of a file in reverse order.
12. Write a program to compute the number of characters, words and lines in a file.
13. Write a function nearly equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation.
14. Write function to compute gcd, lcm of two numbers. Each function shouldn’texceed one line

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	15	20	10	40	10

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

DOMAIN ELECTIVE-IV

ENERGY MANAGEMENT

Course Code- BTH 606 **Credit Unit:03**

Module I Energy Scenario Commercial & Non commercial energy, primary energy resources, commercial energy production, final energy consumption, energy need of growing economy, long term energy scenario, energy pricing, energy sector reform, energy & environment, energy conservation and its importance, re- structuring of the energy supply sector, energy strategy for future, energy conservation act.

Module II Energy Management & Energy Planing Definition & significance, energy strategy, objective of energy management, hierarchical levels of supply side energy management, trade off b/w energy management, energy strategies & energy planning, energy & economy, essential imperatives & steps in supply side energy planning, energy planning flow for supply side, essential data for supply side energy planning, infrastructure planning, transportation of energy, per capita energy consumption, seven principal of energy management, energy policy of a supply organization & demand side organization,

Module III Energy Audit & Energy Monitoring, Targeting and Conservation Introduction, need, types & procedure of energy audits, modern techniques and instruments for energy audit. Defining monitoring & targeting, element of monitoring & targeting, data & information analysis, techniques- energy consumption, production & cumulative sum of differences (CUSUM). Energy conservation opportunity, electrical & thermodynamic ECOs, ECOs in chemical process industries, waste management & recycling of discard material and energy.

Module IV Advancement In Technologies & Future Energy Alternatives 23 Recent advancement in energy technology towards 21st century, transport of energy, ethanol as a fuel. Fusion – introduction potential, condition for fusion, magnetic confinement fusion reactor, cold fusion laser induced fusion. Biomass –introduction, municipal waste, biomass conversion, wood combustion Geothermal energy – introduction, origin, nature, resources and exploration, environment impact, low temperature geothermal resources.

Module V Case Studies Energy conservation in alcohol industry. Energy conservation in fertilizer industry and pulps & paper industry. Energy conservation in different units of refinery likes FCCU, HCU & ADU

Text Books 1. Murphy W.R. and Mckay G., Energy Management(BH)
2. Hinrich & Kleinbach “Energy : its use and the environment” III ed. Harcourt.
3. Boyle “Renewable Energy : Power for a sustainable future” Oxford.
4. Rao S. & Parulckar B.B. ”Energy technology” khhanna publisher
5. Capenart & Turner “ Guide to energy management ” 6 ed. Keinnedu fairmant press.

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

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

DOMAIN ELECTIVE-IV

ENERGY RESOURCES AND UTILIZATION

Course Code: BTH 607 **Credit Units: 03**

Course Contents:

Module I: **Energy Scenario & Conservation**

Indian and global, energy crisis, Classification of various energy sources, Renewable and non-renewable energy sources, Remedial measures to some energy crisis.Biogas plants and their operation, Biomass and its conversion routes to gaseous and liquid fuels. Wind energy, its potential and generation by wind mills

Module II: Alternative Sources of Energy

Fuel cell, Solar Energy: Photo thermal and photovoltaic conversion and utilization methods , solar water heating , cooking , drying and its use for other industrial processes ,solar cells their material and mode of operation . direct and indirect methods solar energy storage , sensible heat and latent heat storage materials Solar ponds ,Bio energy, biogas plants and their operation biomass and its conversion roots to gaseous and liquid fuels ,wind energy , its potential and generation by wind mills,Hydroelectric potential, its utilization & production, Geothermal energy its potential status and production, Nuclear energy : Status, nuclear raw materials, nuclear reactors and other classification, Generation of Nuclear power, Nuclear installations in India and their capacity of generation, Limitations of nuclear energy, Reprocessing of spent nuclear fuel, Cogeneration of fuel and power, Energy from tidal and ocean thermal sources, MHD systems.

Module III: Fossil and Processed Fuel
Coal its origin and formation, Coal analysis, Coal classification, Coal preparation, Coal washing and coal blending, Coal carbonization, Treatment of coal gas and recovery of chemical from coal tar, Coal gasification, liquid fuel synthesis from coal, CBM. Petroleum crude, Types of crude ,emergence of petroleum products as energy, Gaseous Fuels: Natural gas, Water gas, producer gas, L.P.G., bio- gas, coke oven gas, blast furnace gas, LNG ,CNG,Gas hydrates ,GTL Technology (gas to liquid), Biodiesel.

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

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

Text Books
1. Brame J.S.S. and King J.G., Edward Arnold “Fuel Solid, Liquid and Gases” Edward Arnold (1967).
2.Sukhatme S.P, "Solar Energy - Principles of Thermal Collection and Storage",2nd Ed.,Tata McGraw- Hill., (1996).

COMMUNICATION SKILLS - IV

Course Code: BCS 601 **Credit Units: 01**

Course Objective:

To enhance the skills needed to work in an English-speaking global business environment.

Course Contents:

Module I: Business/Technical Language Development
Advanced Grammar: Syntax, Tenses, Voices
Advanced Vocabulary skills: Jargons, Terminology, Colloquialism
Individualised pronunciation practice

Module II: Social Communication
Building relationships through Communication
Communication, Culture and Context
Entertainment and Communication
Informal business/ Technical Communication

Module III: Business Communication
Reading Business/ Technical press
Listening to Business/ Technical reports (TV, radio)
Researching for Business /Technology

Module IV: Presentations
Planning and getting started
Design and layout of presentation
Information Packaging
Making the Presentation

Examination Scheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage (%)	20	20	25	10	10	10	5

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

Text & References:

- Business Vocabulary in Use: Advanced Mascull, Cambridge
- Business Communication, Raman – Prakash, Oxford
- Business Communications, Rodgers, Cambridge
- Working in English, Jones, Cambridge
- New International Business English, Jones/Alexander, Cambridge

BEHAVIOURAL SCIENCE - VI
(STRESS AND COPING STRATEGIES)

Course Code: BSS 604 **Credit Units: 01**

Course Objective:

To develop an understanding the concept of stress its causes, symptoms and consequences.
To develop an understanding the consequences of the stress on one's wellness, health, and work performance.

Course Contents:

Module I: Stress
Meaning & Nature
Characteristics
Types of stress

Module II: Stages and Models of Stress
Stages of stress
The physiology of stress
Stimulus-oriented approach.
Response-oriented approach.
The transactional and interact ional model.
Pressure – environment fit model of stress.

Module III: Causes and symptoms of stress
Personal
Organizational
Environmental

Module IV: Consequences of stress
Effect on behaviour and personality
Effect of stress on performance
Individual and Organizational consequences with special focus on health

Module V: Strategies for stress management
Importance of stress management
Healthy and Unhealthy strategies
Peer group and social support
Happiness and well-being

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:

- Blonna, Richard; Coping with Stress in a Changing World: Second edition
- Pestonjee, D.M, Pareek, Udai, Agarwal Rita; Studies in Stress and its Management
- Pestonjee, D.M.; Stress and Coping: The Indian Experience
- Clegg, Brian; Instant Stress Management – Bring calm to your life now

FRENCH - VI

Course Code: FLT 601 Credit Units: 02

Course Objective:

To strengthen the language of the students both in oral and written so that they can:
i) express their sentiments, emotions and opinions, reacting to information, situations;
ii) narrate incidents, events;
iii) perform certain simple communicative tasks.

Course Contents:

Module D: pp. 157 – 168 – Unité 12

Unité 12: s'évader

1. présenter, caractériser, définir
2. parler de livres, de lectures
3. préparer et organiser un voyage
4. exprimer des sentiments et des opinions
5. téléphoner
6. faire une réservation

Contenu grammatical:

1. proposition relative avec pronom relatif "qui", "que", "où" - pour caractériser
2. faire + verbe

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- le livre à suivre: Campus: Tome 1

GERMAN - VI

Course Code: FLG 601 **Credit Units: 02**

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany
Introduction to Advanced Grammar and Business Language and Professional Jargon

Course Contents:

Module I: Adjective endings
Adjective endings in all the four cases discussed so far
Definite and indefinite articles
Cases without article

Module II: Comparative adverbs
Comparative adverbs as and like

Module III: Compound words
To learn the structure of compound words and the correct article which they take
Exploring the possibility of compound words in German

Module IV: Infinitive sentence
Special usage of 'to' sentences called zu+ infinitive sentences

Module V: Texts
A Dialogue: 'Ein schwieriger Gast'
A text: 'Abgeschlossene Vergangenheit'

Module VI: Comprehension texts
Reading and comprehending various texts to consolidate the usage of the constructions learnt so far in this semester.

Module VII: Picture Description
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;
Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH – VI

Course Code: FLS 601 **Credit Units: 02**

Course Objective:

To enable students acquire working knowledge of the language; to give them vocabulary, grammar, voice modulations/intonations to handle everyday Spanish situations in Present as well as in Present Perfect Tense with ease.

Course Contents:

Module I
Revision of the earlier modules

Module II
Present Perfect Tense

Module III
Commands of irregular verbs

Module IV
Expressions with **Tener que** and **Hay que**

Module V
En la embajada
Emergency situations like fire, illness, accident, theft

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras

CHINESE – VI

Course Code: FLC 601 Credit Units: 02

Course Objective:

Chinese emperor Qin Shi Huang – Ti who built the great wall of China also built a network of 270 palaces, linked by tunnels, and was so afraid of assassination that he slept in a different palace each night. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I
Drills
Dialogue practice
Observe picture and answer the question.
Pronunciation and intonation.
Character writing and stroke order.

Module II
Going out to see a science exhibition
Going to the theatre.
Train or Plane is behind schedule.
Indian Economy-Chinese Economy
Talking about different Seasons of the Year and Weather conditions. Learning to say phrases like-spring, summer, fall, winter, fairly hot, very cold, very humid, very stuffy, neither hot nor cold, most comfortable, pleasant …. etc.

Module III
Temperature – how to say – What is the temperature in May here?
- How is the weather in summer in your area?
- Around 30 degrees
- Heating, air-conditioning
- Is winter is Shanghai very cold?

Talking about birthdays and where you were born?
The verb "shuo" (speak) saying useful phrases like speak very well, do not speak very well, if speak slowly then understand if speak fast then don't understand, difficult to speak, difficult to write, speak too fast, speak too slow, listen and can understand, listen and cannot understand … etc.
Tell the following in Chinese – My name is …. I was born in … (year). My birthday is …… Today is … (date and day of the week). I go to work (school) everyday. I usually leave home at . (O'clock). In the evening, I usually ……. (do what)? At week end, I ……. On Sundays I usually …… It is today….. It will soon be my younger sisters birthday. She was born in ….. (year). She lives in ……. (where). She is working (or studying)…… where… She lives in …….. (where.)

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Elementary Chinese Reader Part-2, 3; Lesson 47-54

MODELLING & SIMULATION

Course Code: BTH 701 **Credit Units: 04**

Module I Introduction to mathematical modeling; Advantages and limitations of models and applications of process models of stand-alone unit operations and unit processes; Classification of models – Simple vs. rigorous, Lumped parameter vs. distributed parameter; Steady state vs. dynamic, Transport phenomena based vs. Statistical; Concept of degree of freedom analysis

Module II Simple examples of process models; Models giving rise to nonlinear algebraic equation (NAE) systems, - steady state models of flash vessels, equilibrium staged processes distillation columns, absorbers, strippers, CSTR, heat exchangers, etc.; Review of solution procedures and available numerical software libraries

Module III Steady state models giving rise to differential algebraic equation (DAE) systems; Rate based approaches for staged processes; Modeling of differential contactors - distributed parameter models of packed beds; Packed bed reactors; Modeling of reactive separation processes; Review of solution strategies for Differential Algebraic Equations (DAEs), Partial Differential Equations (PDEs), and available numerical software libraries

Module IV Unsteady state (time dependent) models and their applications; Simple dynamic models of Batch reactors, Adsorption columns, Multistage separation systems; Model reduction through orthogonal collocation; Review of solution techniques and available numerical software libraries

Module V Introduction to flow sheet simulation; Sequential modular approach; Equation oriented approach; partitioning and tearing; Recycle convergence methods; Review of thermodynamic procedures and physical property data banks

Text Books 1. Luyben W.L., “Process Modeling, Simulation, and Control for Chemical Engineering”, Wiley.
2. M.M. Denn, “Process Modelling”, Wiley, New York, (1990).
Reference Books
1. Hussain Asghar, “Chemical Process Simulation”, Wiley Eastern Ltd., New Delhi, (1986)
2. C.D. Holland and A.I. Liapis, “Computer Methods for Solving Dynamic Separation Problems”, McGraw Hill, (1983).
3. C.D. Holland, “Fundamentals of Modelling Separation Processes”, Prentice Hall, (1975)
4. S.M. Walas, “Modelling with Differential Equations in Chemical Engineering”, Butterworth, (1991)
5. M.E. Davis, “Numerical Methods and Modelling for Chemical Engineers”, Wiley, New York(1984)

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

PETROLEUM REFINING

Course Code: BTH 702 Credit Units: 03

Course Contents:

Module I: **Introduction**

Petroleum Exploration Production and Refining of Crude oils Crude oils: Chemistry and composition Characteristics and constituents of crude oils, Classification of crude oils).

Module II: **Petroleum Properties & Products**

Quality Control of Petroleum Products Classification of laboratory tests, distillation, vapour pressure, flash and fire points, octane number, performance number, cetane number, aniline point, viscosity index, calorific value, smoke point, char value, viscosity, viscosity index, penetration tests, cloud and pour points, drop point of grease, melting and settling points of wax, softening point of Bitumen, induction period of gasoline, thermal stability of jet fuels, gum content, Total Sulphur, Acidity and Alkalinity,, Copper Strip Corrosion Test, Silver – Strip Corrosion Test for ATF, Ash, Carbon Residue (Conradson method, Ramsbottom method) Colour, Density and Specific gravity, Refractive index of hydrocarbon liquids, water separation index (modified) (WSIM), ductility. Composition, Properties & Specification of LPG, Naphthas, motor spirit, Kerosine, Aviation Turbine Fuels, Diesel Fuels, Fuel Oils, Petroleum Hydrocarbon Solvents, Lubricating oils (automotive engine oils, industrial lubricating oils electrical insulating oils, Jute Batching oils, white oils, steam turbine oils, metal working oils, etc.) Petroleum Waxes Bitumens, Petroleum coke.

Module III: **Crude Oil Distillation**

Desalting of crude oils, Atmospheric distillation of crude oil, Vacuum distillation of atmospheric residue. Thermal Conversion Process Thermal Cracking Reactions, Thermal Cracking, Visbreaking, (Conventional Visbreaking and Soaker Visbreaking) Coking (Delayed Coking, Fluid Coking, Flexicoking), Calcination of Green Coke.

Module IV: **Catalytic Conversion Process**

Fluid catalytic cracking; Catalytic reforming; Hydrocracking Catalytic Alkylation, Catalytic Isomerization; Catalytic Polymerization. Finishing Process Hydrogen sulphide removal processes; Sulphur conversion processes; Sweetening processes (Caustic treatment, Solutizer process; Doctor treating process; Copper chloride sweetening,; Hypochlorite sweetening ;Air and inhibitor treating process; Merox processes;Sulphuric acid treatment; Clay treatment); Solvent extraction processes (Edeleanu process, Udex process, Sulfolane process), Hydrotreating processes.

Module V: **Lube Oil Manufacturing Process**

Evaluation of crude oils for lube oil base stocks, Vacuum distillation, Solvent deasphalting Solvent extraction of lube oil fractions (Furfural, NMP and Phenol), Solvent dewaxing, Hydrofinshing, Manufacture of petroleum waxes (Wax sweating, Solvent deoiling) Manufacture of Bitumens Selection of crude oil, Methods of manufacture of bitumens, (Distillation, Solvent precipitation, Air blowing).

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

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

Books Recommended

1. Ram Prasad, Petroleum Refining Technology, Khanna Publication
2. Nelson, W.L., Petroleum Refining Engineering, McGraw Hill
3. Mall, I D, Petrochemical Process Technology, McMillan India

TRANSPORT PHENOMENA

Course Code: BTH 703 **Credit Units: 04**

Course Contents:

Module I: **Introduction to Transport Phenomena**

Similarity between momentum, heat and mass transfer, The continuum hypothesis, Basic laws of fluid motion, Newton's second law of motion, principle of balance between momentum, heat and mass transfer,Principles of conservation of momentum, mass and energy.

Module II: **Momentum Transport Phenomena**

Momentum transport in laminar flow: Newton's law of viscosity, Science of rheology, Prediction of viscosity and its dependence on temperature, pressure and composition, Boundary conditions, Shell balance approach for stress distribution and velocity profiles. Introduction to time derivatives and vector analysis, Equation of continuity and equation of motion and their applications in fluid flow problems.

Module III: **Unsteady state momentum transport**

Flow near a wall suddenly set in motion, Momentum transport phenomena in turbulent flow. Definitions of friction factors, friction factor for flow in tubes, for flow around spheres, for packed bed column.

Module IV: **Energy Transport Phenomena**

Energy transport in laminar flow: Fourier's law of heat conduction, Prediction of thermal conductivities and its dependence on temperature, pressure and composition, Boundary conditions, shell balance approach. Types of heat sources, Principle of extended surfaces, types of cooling fans, free and forced convection. Unsteady state heat transport, Unsteady state heat conduction in solids, heating of semi-infinite slab, heating of finite slab.

Module V: Mass Transport Phenomena

Definitions of concentration, velocities and mass fluxes, Fick's law of diffusion, Prediction of diffusivity and its dependence on temperature, pressure and composition, Boundary conditions, Shell balance approach for mass transfer problems, Problems of diffusion with homogeneous and heterogeneous chemical reaction, Diffusion and chemical reaction in porous catalyst – the effectiveness factor. The equation of continuity for multi component mixtures.

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

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

Text Books

1. **Bird, R. B., Stewart, W. E. and Lightfoot, E. N.,** "*Transport Phenomena*", 2nd edition John Wiley (1960).
2. **Bannet, C. O. and Myers J. E**., "*Momentum Heat and Mass Transfer*" Tata McGraw Hill, (1973)..

Reference Books

1. **Beck, W. J. and Muttzall, K.M.K**., "*Transport Phenomena*", John Wiley, (1975).
2. **Scissom, L. E. and Pitts, D. R.,** "*Elements of Transport Phenomena*", McGraw Hill, (1972).

ADVANCED PROGRAMMING WITH PYTHON

Course Code: BCS 710 **Credit Units: 03**

Course Objective:
The course should enable the students:

- Describe the semantics of Python programming language and illustrate the process of structuring the data using lists, dictionaries, tuples, strings and sets.
- Illustrate the Object-oriented Programming concepts in Python.
- Demonstrate the basic database design for storing data as part of a multi-step data gathering, analysis, and processing.
- Familiarize the basics of machine learning using an approachable, and also understand the advantage of using Python libraries for implementing Machine Learning models Course Outcomes: After completion of this course, student will be able to:

Course Outcomes:

- Interpret the basic principles of Python programming language.
- Articulate the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python.
- Identify the commonly used operations involving file systems and regular expressions.
- Implement Machine Learning algorithms.

Course Contents:

UNIT-I:

Introduction to Python, use IDLE to develop programs, Basic coding skills, working with data types and variables, working with numeric data, working with string data, Python functions, Boolean expressions, selection structure, iteration structure, working with lists, work with a list of lists, work with tuples, work with dates and times, get started with dictionaries

Learning Outcome:
At the end of this Unit the student will be able to

- Solve, test and debug basic problems using python script.
- Manipulate python programs by using the python data structures like lists, dictionaries, tuples, strings and sets.

UNIT-II

Classes in Python: OOPS Concepts,Classes and objects ,Classes in Python, Constructors, Datahiding, Creating Classes, Instance Methods, Special Methods, Class Variables, Inheritance, Polymorphism, Type Identification, Custom Exception Classes, Iterators, generators and decorators.

Learning Outcome:At the end of this Unit the student will be able to

- Design object-oriented programs with Python classes.
- Usage of inheritance and polymorphism for reusability.

UNIT-III

I/O and Error Handling In Python :Introduction, Data Streams, Creating Your Own Data Streams, Access Modes, Writing Data to a File, Reading Data From a File, Additional File Methods, Handling IO Exceptions, Errors, Run Time Errors, The Exception Model, Exception Hierarchy, Handling Multiple Exceptions, Working with Directories.

Learning Outcome: At the end of this Unit the student will be able to

- Identify the commonly used operation involved in files for I/O processing.

- Familiarize the handling of I/O Exception sand usage of Directories.

UNIT-IV

Implement Machine Learning algorthims:Usage of Numpy for numerical Data,Usage of Pandas for Data Analysis, Matplotlib for Python plotting, Seaborn for Statically plots, interactive Dynamic visualizations, SciKit for Machine learning.

Learning Outcome: At the end of this Unit the student will be able to
Understand the advantage of using Python libraries for implementing Machine Learning models.

Projects:
Creating a discussion form, creating an online store, creating a job site.

Examination Scheme:

Components	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	15	20	10	50

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

Text & References:

1. Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016.
2. Haltermanpython.
3. Mark Lutz, Programming Python, O`Reilly, 4th Edition, 2010ONLINE

RESOURCES:
https://www.w3schools.com/python.
https://docs.python.org/3/tutorial/index.html.
https://www.python-course.eu/advanced_topics.ph

ADVANCED PROGRAMMING WITH PYTHON LAB

Course Code: BCS730 **Credit Units: 01**

List of Assignment:

- Practice Assignment based on string data, Python functions, and Boolean expressions.
- Practical based on iteration, working with lists, tuples and dictionaries.
- Practical based on class, objects, constructor, method in side class.
- Practical questions based on Inheritance, Polymorphism, Type Identification, Custom Exception Classes.
- Handling Errors using Python.
- Practical Assignment based on Usage of Numpy for numerical Data,
- Practical Assignment based on Usage of Usage of Pandas for Data Analysis.
- Practical Assignment based on Usage of Matplotlib for Python plotting.
- Practical Assignment based on Usage of Seaborn for Statically plots.
- Practical Assignment based on Usage of Interactive Dynamic visualizations.
- Practical Assignment based on Usage of SciKit for Machine learning.

Examination Scheme:

IA				EE	
A	**PR**	**LR**	**V**	**PR**	**V**
5	15	20	10	40	10

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

COMMUNICATION SKILLS - V

Course Code: BCS 701 **Credit Units: 01**

Course Objective:

To facilitate the learner with Academic Language Proficiency and make them effective users of functional language to excel in their profession.

Course Contents:

Module I
Introduction to Public Speaking
Business Conversation
Effective Public Speaking
Art of Persuasion

Module II: Speaking for Employment
Types of Interview
Styles of Interview
Facing Interviews-Fundamentals and Practice Session
Conducting Interviews- Fundamentals and Practice Session
Question Answer on Various Dimensions

Module III
Resume Writing
Covering Letters
Interview Follow Up Letters

Module IV: Basic Telephony Skills
Guidelines for Making a Call
Guidelines for Answering a Call

Module V: Work Place Speaking
Negotiations
Participation in Meetings
Keynote Speeches

Examination Scheme:

Components	CT1	CT2	CAF	V	GD	GP	A
Weightage (%)	20	20	25	10	10	10	5

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

Text & References:

- Jermy Comfort, Speaking Effectively, et.al, Cambridge
- Krishnaswamy, N, Creative English for Communication, Macmillan
- Raman Prakash, Business Communication, Oxford.
- Taylor, Conversation in Practice,

BEHAVIOURAL SCIENCE - VII
(INDIVIDUAL, SOCIETY AND NATION)

Course Code: BSS 704 **Credit Units: 01**

Course Objective:

This course aims at enabling students towards:

- Understand the importance of individual differences
- Better understanding of self in relation to society and nation
- Facilitation for a meaningful existence and adjustment in society
- Inculcating patriotism and national pride

Course Contents:

Module I: Individual differences & Personality
Personality: Definition& Relevance
Importance of nature & nurture in Personality Development
Importance and Recognition of Individual differences in Personality
Accepting and Managing Individual differences (adjustment mechanisms)
Intuition, Judgment, Perception & Sensation (MBTI)
BIG5 Factors

Module II: Managing Diversity
Defining Diversity
Affirmation Action and Managing Diversity
Increasing Diversity in Work Force
Barriers and Challenges in Managing Diversity

Module III: Socialization
Nature of Socialization
Social Interaction
Interaction of Socialization Process
Contributions to Society and Nation

Module IV: Patriotism and National Pride
Sense of pride and patriotism
Importance of discipline and hard work
Integrity and accountability

Module V: Human Rights, Values and Ethics
Meaning and Importance of human rights
Human rights awareness
Values and Ethics- Learning based on project work on Scriptures like- Ramayana, Mahabharata, Gita etc.

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	A	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:

- Davis, K. Organizational Behaviour,
- Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
- Dressler, David and Cans, Donald: The Study of Human Interaction
- Lapiere, Richard. T – Social Change
- Lindzey, G. and Borgatta, E: Sociometric Measurement in the Handbook of Social Psychology, Addison – Welsley, US.
- Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
- Robbins O.B.Stephen;. Organizational Behaviour

FRENCH - VII

Course Code: FLT 701 Credit Units: 02

Course Objective:

Revise the portion covered in the first volume, give proper orientation in communication and culture.

Course Contents:

Module A: Unités 1 – 3: pp. 06 - 46

Contenu lexical:

Unité 1: Rédiger et présenter son curriculum vitae
Exprimer une opinion
Caractériser, mettre en valeur
Parler des rencontres, des lieux, des gens

Unité 2: Imaginer - Faire des projets
Proposer - conseiller
Parler des qualités et des défauts
Faire une demande écrite
Raconter une anecdote
Améliorer son image

Unité 3: Exprimer la volonté et l'obligation
Formuler des souhaits
Exprimer un manque/un besoin
Parler de l'environnement, des animaux, des catastrophes naturelles

Contenu grammatical:

1. Le passé : passé composé/imparfait
2. Pronoms compléments directs/indirects, y/en (idées/choses)
3. Propositons relatives introduites par qui, que, où
4. Comparatif et superlatif
5. Le conditionnel présent
6. Situer dans le temps
7. Féminin des adjectifs
8. La prise de paroles : expressions
9. Le subjonctif : volonté, obligation

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- le livre à suivre : Campus: Tome 2

GERMAN - VII

Course Code: FLG 701 **Credit Units: 02**

Course Objective:

To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany
Introduction to Advanced Grammar and Business Language and Professional Jargon

Course Contents:

Module I: Dass- Sätze
Explain the use of the conjunction "-that", where verb comes at the end of the sentence

Module II: Indirekte Fragesätze
To explain the usage of the "Question Pronoun" as the Relative Pronoun in a Relative Sentence, where again the verb falls in the last place in that sentence.

Module III: Wenn- Sätze
Equivalent to the conditional "If-" sentence in English. Explain that the verb comes at the end of the sentence.

Module IV: Weil- Sätze
Explain the use of the conjunction "because-" and also tell that the verb falls in the last place in the sentence.

Module V: Comprehension texts
Reading and comprehending various texts to consolidate the usage of the constructions learnt so far in this semester.

Module VI: Picture Description
Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;
Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

SPANISH - VII

Course Code: FLS 701 **Credit Units: 02**

Course Objective:

To enable students acquire working knowledge of the language; to give them vocabulary, grammar, expressions used on telephonic conversation and other situations to handle everyday Spanish situations with ease.

Course Contents:

Module I
Revision of earlier semester modules

Module II
Zodiac signs. More adjectives…to describe situations, state of minds, surroundings, people and places.

Module III
Various expressions used on telephonic conversation (formal and informal)

Module IV
Being able to read newspaper headlines and extracts (Material to be provided by teacher)

Module V
Negative commands (AR ending verbs)

Module VI
Revision of earlier sessions and introduction to negative ER ending commands, introduction to negative IR ending verbs

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español En Directo I A, 1B
- Español Sin Fronteras
- Material provided by the teacher from various sources

CHINESE – VII

Course Code: FLC 701 **Credit Units: 02**

Course Objective:

The story of Cinderella first appears in a Chinese book written between 850 and 860 A.D. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

Module I
Drills
Dialogue practice
Observe picture and answer the question.
About china part –I Lesson 1,2.

Module II
Pronunciation and intonation
Character Writing and stroke order.

Module III
Ask someone what he/she usually does on weekends?
Visiting people, Party, Meeting, After work….etc.

Module IV
Conversation practice
Translation from English to Chinese and vise-versa.
Short fables.

Module V
A brief summary of grammar.
The optative verb "yuanyi".
The pronoun "ziji".

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- "Kan tu shuo hua" Part-I Lesson 1-7

INDUSTRIAL TRAINING

Course Code: BTH 750 **Credit Units: 03**

Methodology:

Practical training is based on the theoretical subjects studied by students. It can be arranged within the college or in any related industrial unit. The students are to learn various industrial, technical and administrative processes followed in the industry. In case of on-campus training the students will be given specific task of fabrication/assembly/testing/analysis. On completion of the practical training the students are to present a report covering various aspects learnt by them and give a presentation on same.

Examination Scheme:

Feedback from industry/work place	30
Training Report	30
Viva	15
Presentation	25
Total	**100**

SEMINAR

Course Code: BTH 760 Credit Units: 03

The student would be allotted a project in the beginning of the VII semester itself. The project will be based on the industry where he/she has undergone in plant training in industry during summer vacations. He/She would be expected to submit a detailed plant design report later in the (VIII) semester. In this semester he/she will be assessed for the work that he/she does during the seventh semester under the supervision of a faculty of the department.

Examination Scheme:

Literature study/ Fabrication/ Experimentation	40
Written Report	20
Viva	15
Presentation	25
Total	100

PLANT DESIGN AND ECONOMICS

Course Code: BTH 801 Credit Units: 04

Course Contents:

Module I: Process **Development**

Process selection, study of alternative processes, pilot plant, Scale up methods, Flow sheet preparation, sketching techniques, Equipment numbering, Stream designation, Material and energy balances.

Module II: Plant **Design**

Process selection -Selection of equipment, specification and design of equipment's, material of construction, Plant location, Plant layout and installation, Safety, Start up, Shutdown and Operating guidelines.

Module III: Process **Utility & Management**

Various process utilities, their role and importance in chemical plants.Water Sources Sources of water and their characteristics ;Treatment storage and distribution of water; water for use in boilers, cooling purposes, drinking and process; Reuse and conservation of water; Water resource management.

Module IV: **Steam Generation and Utilization**

Steam generation and its application in chemical process plants, distribution and utilization ;Design of efficient steam heating systems; steam economy, Steam condensers and condensate utilization Expansion joints ,flash tank design, steam traps their characteristics, selection and application, waste heat utilization.; Lagging, selection and
thickness .Selection and sizing of boilers; waste heat boilers.

Module V: **Compressors, blowers, Vacuum Pumps**

Compressors, blowers and vacuum pumps and their performance characteristics; Methods of developing vacuum and their limitations, material handling under vacuum, Piping systems; Lubrication and oil removal in compressors and pumps. Air filters, Air and gas leakage. Inert gas systems, compressed air for process, Instrument air.
Importance of insulation for meeting the process requirement, insulation materials and their effect on various material of equipment piping, fitting and valves etc. insulation for high intermediate, low and sub zero temperatures, including cryogenic insulation.

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

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

Books Recommended

1.Peters M., Timmerhaus K. & Ronald W., Plant Design & Economics for Chemical Engineers, McGraw Hill
2.James R Couper, Process Engg. Economics (Chemical Industries) CRC Press
3. Aries & Newton, Chemical Engg. Cost Estimation, McGraw Hill

SAFETY AND HAZARDS ANALYSIS

Course Code: BTH 802 Credit Units: 03

Course Contents:

Module I: **Introduction**

Types of Ecosystems, Factors responsible for the distribution on Hydrologic cycles, Nutrient cycles (carbon, nitrogen, phosphorous, sulfur). Introduction to ISO standards (ISO 14001) with reference to chemical industry. Industrial hygiene and safety aspects related to toxicity, noise, radiation: Identification, Evaluation, Control

Module II:**Fires and Explosions**

Flammability Characteristics of liquids & vapors, minimum oxygen concentration (MOC), Ignition Energy, Ignition sources, Explosions: Detonation & Deflagration, combined explosions, BLEVE, Blast Damage due to overpressure.

Hazard identification: Various Techniques, HAZOP.

Module III: **Consequence analysis and Hazards / Risk Assessment**

Flow of liquid/vapors through hole, flashing liquid, Pool evaporation. Design to prevent fire & explosions: Inerting, controlling static electricity, explosion proof equipments & instruments, ventilation, sprinkler systems. Event trees, fault trees, reliability, probability Emergency planning: Elements of emergency planning, on-site/ off-site emergency plans.

Module IV: **Case studies**

Bhopal Tragedy, Flixborough Disaster, Mexico Disaster

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

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

Books & References:

1. Chemical Process Safety Fundamentals with Applications: Daniel A Crowl, Joseph F. Lovvar, Prentice Hall Inc, U.S.A
2. Safety in Process Plant Design, Wells, G.L. Godwin, London (1980)
3. Safety for Chemical Engineers, A.I.Ch.E. Publications (1976-77)

NEW SEPARATION PROCESS

Course Code: BTH 803 Credit Units: 03

Course Contents:

Module I: **Introduction to Separation Processes**

Uses and characterization of separation processes, equilibrium and rate governed multistage processes.

Module II: **Cascade and Interstage flows**

Ideal cascades total interstage flows, squared off cascades, seperative duty and potential, energy requirement for separation processes.

Module III: **Membrane Separation Processess**

Membrane characterization, Gas permeation through polymeric membranes, Liquid membrane separation processes, reverse osmosis , Concentration polarization.

Module IV: Types of Membrane Separation

Dialysis, Ultra filtration, Electro dialysis.

Module V: Advanced Separation Processes

Chromatographic separation, molecular sieve separations.

Examination Scheme:

Components	A	V	H	CT	EE
Weightage (%)	5	15	15	15	50

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

Books Recommended

1.Geankoplis, C.J.. "Transport Processes and Unit Operations", 3rd ed. Prentice Hall. (1993)
2. Sun-Tak-Hwang and Karl Kammermeyer – Membranes in Separations – John Wiley & Sons, New York (1975)
3. J.M. Coulson and J.F. Richardson – Chemical Engineering: Particle Technology and Separation Processes, Vol. 2, 4th Edition, Asian Books Pvt. Ltd. New Delhi (1998)

PROJECT

Course Code: BTH 860 **Credit Units: 12**

This project course is in continuation of project course allotted in the beginning of the VII the semester Here the students are supposed to do the detail work as scheduled in the last semester. Finally he/she will be required to submit a detailed project report on which viva-voce examination will be conducted by a committee having one External Examiner.

Examination Scheme:

Literature study/ Fabrication/ Experimentation	40
Written Report	20
Viva	15
Presentation	25
Total	100