ANNA UNIVERSITY, CHENNAI
UNIVERSITY DEPARTMENTS
CHOICE BASED CREDIT SYSTEM
B.TECH. PETROLEUM ENGINEERING AND TECHNOLOGY

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

I. To inculcate in students, a professional and ethical attitude, effective communication skills, teamwork skills, multidisciplinary approach, and an ability to solve problems encountered in petrochemical sector
II. To make the students conversant with oils and their properties, principles of chemical analysis and preparation of chemicals
III. To acquaint the students with the standards for the analysis of petroleum products
IV. To give them an opportunity to gain knowledge on various reaction mechanisms
V. To help the students understand the theory, instrumentation and applications of analytical equipments used in industries for testing the quality of petroleum, intermediates and products
VI. To make them learn basic rock and fluid properties relevant to petroleum reservoirs
VII. To teach the students to solve chemical engineering problems using C and MATLAB and other computational tools
VIII. To given an introduction to the students on control systems along with instrumentation

PROGRAMME OUTCOMES (POs):

On successful completion of the programme,

I. Graduates will be able to demonstrate their knowledge professionally and shoulder ethical responsibilities
II. Graduates will be capable to design experiments, analyze and interpret data
III. Graduates will be able to meet the world's ever-increasing demand for hydrocarbon fuel, thermal energy, and waste and pollution management
IV. Graduates will gain a knowledge of the basic principles involved in different chemical synthesis and will be able to apply them in chemical industries
V. Graduates will have the capacity to choose a proper measuring instrument for a parameter to be measured
VI. Graduates will have a knowledge of different analytical techniques and shall apply them to analyze chemical and petrochemical products
VII. Graduates will understand the characteristics of source and reservoir rocks
VIII. Graduates will become familiar with environmentally sound exploration, evaluation and recovery of oil, gas and other fluids in the earth
IX. Graduates will have the ability to solve chemical engineering problems.
X. Understand the pre requisites of control strategies and the mechanism of advance control systems

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# EMPLOYABILITY ENHANCEMENT COURSES (EEC)

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## SUMMARY

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<td>Non-Credit/ Mandatory</td>
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COURSE DESCRIPTION:
This course aims at developing the language skills necessary for the first year students of Engineering and Technology.

OBJECTIVES:
• To develop the four language skills – Listening, Speaking, Reading and Writing.
• To improve the students’ communicative competence in English.
• To teach students the various aspects of English language usage.

CONTENTS
UNIT I GREETING AND INTRODUCING ONESELF 12
Listening- Types of listening – Listening to short talks, conversations; Speaking – Speaking about one’s place, important festivals etc. – Introducing oneself, one’s family/ friend; Reading – Skimming a passage– Scanning for specific information; Writing – Guided writing - Free writing on any given topic ( My favourite place/ Hobbies/ School life, writing about one’s leisure time activities, hometown, etc.); Grammar – Tenses (present and present continuous) – Question types - Regular and irregular verbs; Vocabulary – Synonyms and Antonyms.

UNIT II GIVING INSTRUCTIONS AND DIRECTIONS 12
Listening – Listening and responding to instructions; Speaking – Telephone etiquette - Giving oral instructions/ Describing a process – Asking and answering questions; Reading – Reading and finding key information in a given text - Critical reading - Writing –Process description( non-technical); Grammar – Tense (simple past & past continuous) - Use of imperatives – Subject – verb agreement – Active and passive voice; - Vocabulary – Compound words – Word formation – Word expansion ( root words).

UNIT III READING AND UNDERSTANDING VISUAL MATERIAL 12
Listening- Listening to lectures/ talks and completing a task; Speaking –Role play/ Simulation – Group interaction; Reading – Reading and interpreting visual material; Writing - Jumbled sentences – Discourse markers and Cohesive devices – Essay writing (cause & effect/narrative); Grammar – Tenses (perfect), Conditional clauses – Modal verbs; Vocabulary – Cause and effect words; Phrasal verbs in context.

UNIT IV CRITICAL READING AND WRITING 12
Listening- Watching videos/ documentaries and responding to questions based on them; Speaking – Informal and formal conversation; Reading –Critical reading (prediction & inference); Writing – Essay writing ( compare & contrast/ analytical) – Interpretation of visual materials; Grammar – Tenses (future time reference); Vocabulary – One word substitutes (with meanings) – Use of abbreviations & acronyms – Idioms in sentences.

UNIT V LETTER WRITING AND SENDING E-MAI LS 12
Listening- Listening to programmes/broadcast/ telecast/ podcast; Speaking – Giving impromptu talks, Making presentations on given topics- Discussion on the presentation; Reading – Extensive reading; Writing – Poster making – Letter writing (Formal and E-mail) ; Grammar – Direct and Indirect speech – Combining sentences using connectives; Vocabulary – Collocation;

TEACHING METHODS:
Interactive sessions for the speaking module.
Use of audio – visual aids for the various listening activities.
Contextual Grammar Teaching.
EVALUATION PATTERN:
Internals – 50%
End Semester – 50%

TOTAL: 60 PERIODS

LEARNING OUTCOMES:
- Students will improve their reading and writing skills
- Students will become fluent and proficient in communicative English
- Students will be able to improve their interpersonal communication

TEXTBOOK:

REFERENCES:
3. Redston, Chris & Gillies Cunningham Face2Face (Pre-intermediate Student’s Book & Workbook) Cambridge University Press, New Delhi: 2005

MA7151 MATHEMATICS – I

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(Common to all branches of B.E. /B.Tech. Programmes in I Semester)

COURSE OBJECTIVES
- The goal of this course is for students to gain proficiency in calculus computations. In calculus, we use three main tools for analyzing and describing the behavior of functions: limits, derivatives, and integrals. Students will use these tools to solve application problems in a variety of settings ranging from physics and biology to business and economics.
- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

UNIT I DIFFERENTIAL CALCULUS

Representation of functions - New functions from old functions - Limit of a function - Limits at infinity - Continuity - Derivatives - Differentiation rules - Polar coordinate system - Differentiation in polar coordinates - Maxima and Minima of functions of one variable.

UNIT II FUNCTIONS OF SEVERAL VARIABLES

UNIT III INTEGRAL CALCULUS 12
Definite and Indefinite integrals - Substitution rule - Techniques of Integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals.

UNIT IV MULTIPLE INTEGRALS 12

UNIT V DIFFERENTIAL EQUATIONS 12

TOTAL: 60 PERIODS

COURSE OUTCOMES
• Understanding of the ideas of limits and continuity and an ability to calculate with them and apply them.
• Improved facility in algebraic manipulation.
• Fluency in differentiation.
• Fluency in integration using standard methods, including the ability to find an appropriate method for a given integral.
• Understanding the ideas of differential equations and facility in solving simple standard examples.

TEXT BOOKS

REFERENCE BOOKS
PH7151  ENGINEERING PHYSICS  L  T  P  C
3  0  0  3
(Common to all branches of B.E. /B.Tech. Programmes)

COURSE OBJECTIVES
• To introduce the basic physics concepts relevant to different branches of Engineering and Technology.

UNIT I  PROPERTIES OF MATTER
9

UNIT II  ACOUSTICS AND ULTRASONICS
9

UNIT III  THERMAL AND MODERN PHYSICS
9

UNIT IV  APPLIED OPTICS
9

UNIT V  CRYSTAL PHYSICS
9
Single crystalline, polycrystalline and amorphous materials – Single crystals: unit cell, crystal systems, Bravais lattices, ditections and planes in a crystal, Miller indices - interplanar distance for a cubic crystal - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures - structure and significance of NaCl, CsCl, ZnS and graphite - crystal imperfections: point defects, line defects – Burger vectors, dislocations and stacking faults – Growth of single crystals: Bridgman and Czochralski methods.

TOTAL: 45 PERIODS

COURSE OUTCOMES
• The students will acquire knowledge on the basics of physics related to properties of matter, optics, acoustics etc., and they will apply these fundamental principles to solve practical problems related to materials used for engineering applications.
TEXT BOOKS

REFERENCE BOOKS

COURSE OBJECTIVES
- To develop an understanding about fundamentals of polymer chemistry.
- Brief elucidation on surface chemistry and catalysis.
- To develop sound knowledge photochemistry and spectroscopy.
- To impart basic knowledge on chemical thermodynamics.
- To understand the basic concepts of nano chemistry.

UNIT I POLYMER CHEMISTRY
Introduction: Functionality-degree of polymerization. Classification of polymers- natural and synthetic, thermoplastic and thermosetting. Types and mechanism of polymerization: addition (free radical, cationic, anionic and living); condensation and copolymerization. Properties of polymers: Tg, tacticity, molecular weight-weight average, number average and polydispersity index. Techniques of polymerization: Bulk, emulsion, solution and suspension.

UNIT II SURFACE CHEMISTRY AND CATALYSIS

UNIT III PHOTOCHEMISTRY AND SPECTROSCOPY

UNIT IV CHEMICAL THERMODYNAMICS
Second law: Entropy-entropy change for an ideal gas, reversible and irreversible processes; entropy of phase transitions; Free energy and work function: Helmholtzand Gibbs free energy functions; Criteria of spontaneity; Gibbs-Helmholtz equation; Clausius Clapeyron equation; Maxwell relations-Van’t Hoff isotherm and isochore. Chemical potential; Gibbs-Duhem equation- variation of chemical potential with temperature and pressure.
UNIT V  NANOChemistry  

TOTAL : 45 PERIODS

COURSE OUTCOMES
• Will be familiar with polymer chemistry, surface chemistry and catalysis.
• Will know the photochemistry, spectroscopy and chemical thermodynamics.
• Will know the fundamentals of nano chemistry.

TEXT BOOKS

REFERENCE BOOKS

GE7151  COMPUTING TECHNIQUES  
L T P C  
(Common to all branches of Engineering and Technology) 3 0 0 3

OBJECTIVES:
• To learn programming using a structured programming language.
• To provide C programming exposure.
• To introduce foundational concepts of computer programming to students of different branches of Engineering and Technology.

UNIT I  INTRODUCTION  
Introduction to Computers – Computer Software – Computer Networks and Internet - Need for logical thinking – Problem formulation and development of simple programs - Pseudo code - Flow Chart and Algorithms.

UNIT II  C PROGRAMMING BASICS  

UNIT III  ARRAYS AND STRINGS  
UNIT IV         POINTERS  9
Macros - Storage classes – Basic concepts of Pointers – Pointer arithmetic - Example Problems - Basic file operations

UNIT V         FUNCTIONS AND USER DEFINED DATA TYPES  9

TOTAL : 45 PERIODS

OUTCOMES
At the end of the course, the student should be able to:
• Write C program for simple applications
• Formulate algorithm for simple problems
• Analyze different data types and arrays
• Perform simple search and sort.
• Use programming language to solve problems.

TEXTBOOKS:

REFERENCES:

BS7161          BASIC SCIENCES LABORATORY          L T P C
(Common to all branches of B.E. / B.Tech Programmes)  0 0 4 2

PHYSICS LABORATORY: (Any Seven Experiments)

OBJECTIVE:
To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics, properties of matter and liquids.

1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of disc
2. Non-uniform bending - Determination of young’s modulus
3. Uniform bending – Determination of young’s modulus
4. Lee’s disc Determination of thermal conductivity of a bad conductor
5. Potentiometer-Determination of thermo e.m.f of a thermocouple
6. Laser- Determination of the wave length of the laser using grating
7. Air wedge - Determination of thickness of a thin sheet/wire
8. a) Optical fibre -Determination of Numerical Aperture and acceptance angle
b) Compact disc- Determination of width of the groove using laser.
10. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids
11. Post office box - Determination of Band gap of a semiconductor.
13. Viscosity of liquids - Determination of co-efficient of viscosity of a liquid by Poiseuille’s flow

OUTCOME:
The hands on exercises undergone by the students will help them to apply physics principles of optics and thermal physics to evaluate engineering properties of materials.

CHEMISTRY LABORATORY:

(Minimum of 8 experiments to be conducted)

1. Estimation of HCl using Na₂CO₃ as primary standard and Determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler’s method.
4. Determination of chloride content of water sample by argentometric method.
5. Estimation of copper content of the given solution by lodometry.
6. Determination of strength of given hydrochloric acid using pH meter.
7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Estimation of iron content of the given solution using potentiometer.
9. Estimation of iron content of the water sample using spectrophotometer (1, 10-Phenanthroline/thiocyanate method).
10. Estimation of sodium and potassium present in water using flame photometer.
12. Pseudo first order kinetics - ester hydrolysis.
14. Determination of CMC.
15. Phase change in a solid.

TOTAL: 60 PERIODS

TEXTBOOKS

GE7161 COMPUTER PRACTICES LABORATORY

L T P C
0 0 4 2

OBJECTIVES
- To understand the basic programming constructs and articulate how they are used to develop a program with a desired runtime execution flow.
- To articulate where computer programs fit in the provision of computer-based solutions to real world problems.
- To learn to use user defined data structures.

LIST OF EXPERIMENTS
1. Search, generate, manipulate data using MS office/ Open Office
2. Presentation and Visualization – graphs, charts, 2D, 3D
3. Problem formulation, Problem Solving and Flowcharts
4. C Programming using Simple statements and expressions
5. Scientific problem solving using decision making and looping.
6. Simple programming for one dimensional and two dimensional arrays.
7. Solving problems using String functions
8. Programs with user defined functions
9. Program using Recursive Function
10. Program using structures and unions.

TOTAL: 60 PERIODS

OUTCOMES
At the end of the course, the student should be able to:
- Write and compile programs using C programs.
- Write program with the concept of Structured Programming
- Identify suitable data structure for solving a problem
- Demonstrate the use of conditional statement.

LABORATORY REQUIREMENTS FOR BATCH OF 30 STUDENTS
30 Systems with C compiler

HS7251 TECHNICAL ENGLISH

OBJECTIVES
- To enable students acquire proficiency in technical communication.
- To enhance their reading and writing skills in a technical context.
- To teach various language learning strategies needed in a professional environment.

CONTENTS

UNIT I ANALYTICAL READING
Listening- Listening to informal and formal conversations; Speaking – Conversation Skills(opening, turn taking, closing )-explaining how something works-describing technical functions and applications;Reading – Analytical reading, Deductive and inductive reasoning; Writing- vision statement– structuring paragraphs.

UNIT II SUMMARISING
Listening- Listening to lectures/ talks on Science & Technology; Speaking – Summarizing/ Oral Reporting, Reading – Reading Scientific and Technical articles; Writing- Extended definition – Lab Reports – Summary writing.

UNIT III DESCRIBING VISUAL MATERIAL
Listening- Listening to a panel discussion; Speaking – Speaking at formal situations; Reading – Reading journal articles - Speed reading; Writing-data commentary-describing visual material-writing problem-process- solution-the structure of problem-solution texts- writing critiques

UNIT IV WRITING/ E-MAILING THE JOB APPLICATION
Listening- Listening to/ Viewing model interviews; Speaking – Speaking at different types of interviews – Role play practice (mock interview); Reading – Reading job advertisements and profile of the company concerned; Writing- job application – cover letter –Résumé preparation.

UNIT V REPORT WRITING
Listening- Viewing a model group discussion; Speaking – Participating in a discussion - Presentation; Reading – Case study - analyse -evaluate – arrive at a solution; Writing–
Recommendations- Types of reports (feasibility report)- designing and reporting surveys- – Report format.- writing discursive essays.

TEACHING METHODS:
Practice writing
Conduct model and mock interview and group discussion.
Use of audio – visual aids to facilitate understanding of various forms of technical communication.
Interactive sessions.

EVALUATION PATTERN:
Internals – 50%
End Semester – 50%

TOTAL:60 PERIODS

LEARNING OUTCOMES
• Students will learn the structure and organization of various forms of technical communication.
• Students will be able to listen and respond to technical content.
• Students will be able to use different forms of communication in their respective fields.

TEXTBOOK:

REFERENCES:

MA7251 MATHEMATICS – II

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(Common to all branches of B.E. /B.Tech. Programmes in II Semester)

COURSE OBJECTIVES
• To develop the use of matrix algebra techniques this is needed by engineers for practical applications.
• To acquaint the student with the concepts of vector calculus, needed for problems in all engineering disciplines.
• To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow the of electric current.
• To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.
UNIT I MATRICES

UNIT II VECTOR CALCULUS
Gradient and directional derivative – Divergence and Curl – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral - Area of a curved surface - Volume integral - Green’s, Gauss divergence and Stoke’s theorems – Verification and application in evaluating line, surface and volume integrals.

UNIT III ANALYTIC FUNCTION
Analytic functions – Necessary and sufficient conditions for analyticity - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions \( w = z + c, az, \frac{1}{z}, z^2 \) - Bilinear transformation.

UNIT IV COMPLEX INTEGRATION

UNIT V LAPLACE TRANSFORMS

TOTAL : 60 PERIODS

COURSE OUTCOMES
Upon successful completion of the course, students should be able to:
- Evaluate real and complex integrals using the Cauchy integral formula and the residue theorem
- Appreciate how complex methods can be used to prove some important theoretical results.
- Evaluate line, surface and volume integrals in simple coordinate systems
- Calculate grad, div and curl in Cartesian and other simple coordinate systems, and establish identities connecting these quantities
- Use Gauss, Stokes and Greens theorems to simplify calculations of integrals and prove simple results.

TEXT BOOKS

REFERENCE BOOKS
PH7257 PHYSICS OF MATERIALS L T P C
3 0 0 3

OBJECTIVE:
- To introduce the physics of various materials relevant to different branches of technology

UNIT I PREPARATION OF MATERIALS 9

UNIT II ELECTRICAL AND SUPERCONDUCTING MATERIALS 9

UNIT III SEMICONDUCTING MATERIALS 9

UNIT IV DIELECTRIC AND MAGNETIC MATERIALS 9

UNIT V NEW MATERIALS AND APPLICATIONS 9

TOTAL: 45 PERIODS
OUTCOME:
- On completion of the course the students are expected to have a thorough knowledge on the various materials and their physical properties.

REFERENCES:

CY7255 CHEMISTRY FOR TECHNOLOGISTS L T P C
3 0 0 3

OBJECTIVE
- The students should be conversant with
  - boiler feed water requirements, water treatment techniques,
  - Applications of oil and its properties, principles of different chemical analysis.
  - Different kinds of preparations of important chemicals.

OUTCOME
- Will be familiar with boiler feed water requirements, water treatment techniques.
- Will know the oil and its properties, principles of different chemical analysis.
- Will know the preparations of important chemicals.

UNIT I WATER TECHNOLOGY
9

UNIT II OILS, FATS, SOAPS & LUBRICANTS
9
Chemical constitution, chemical analysis of oils and fats – free acid, saponification and iodine values, definitions, determinations and significance. Soaps and detergents - cleaning action of soap. Lubricants - definition, characteristics, types and properties – viscosity, viscosity index, carbon residue, oxidation stability, flash and fire points, cloud and pour points, aniline point. Solid lubricants – graphite and molybdenum disulphide.

UNIT III CHEMICAL ANALYSIS – AN ANALYTICAL INSIGHT
9

UNIT IV DYE CHEMISTRY
9
Witt’s theory and modern theory of colors – synthesis of methyl red, methyl orange, congo red, malachite green, p-rosaniline, phenolphthalein, fluorescence, eosin dyes.

UNIT V CHEMICALS AND AUXILIARIES
9
TEXT BOOKS

REFERENCE BOOKS

GE7152 ENGINEERING GRAPHICS

OBJECTIVES
• To develop in students, graphic skills for communication of concepts, ideas and design of engineering products and expose them to existing national standards related to technical drawings.

CONCEPTS AND CONVENTIONS (NOT FOR EXAMINATION)
1. Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I PLANE CURVES AND FREE HANDSKETCHING
Basic Geometrical constructions, Curves used in engineering practices-Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves. Visualization concepts and Free Hand sketching: Visualization principles – Representation of Three Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES
Orthographic projection- principles-Principal planes-First angle projection-Projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes- Determination of true lengths and true inclinations by rotating line method and trapezoidal method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS
Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to both the principal planes by rotating object method and auxiliary plane method.

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES
Sectioning of solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones. Development of lateral surfaces of solids with cut-outs and holes.
UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS

Principles of isometric projection – isometric scale – Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems.
Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method and vanishing point method.

COMPUTER AIDED DRAFTING (DEMONSTRATION ONLY) 3
Introduction to drafting packages and demonstration of their use.
L=45+T=30, TOTAL: 75 PERIODS

OUTCOMES:
On Completion of the course the student will be able to
- Perform free hand sketching of basic geometrical shapes and multiple views of objects.
- Draw orthographic projections of lines, Planes and Solids
- Obtain development of surfaces.
- Prepare isometric and perspective views of simple solids.

TEXT BOOK:

REFERENCES:

Publication of Bureau of Indian Standards:

Special points applicable to University Examinations on Engineering Graphics:
1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day.
AIM
To study the type of components in which organic reactions take place and also to know the preparation of the essential organic compounds.

OBJECTIVES
At the end of the course students will be in a position to have knowledge on various reaction mechanism, preparation of organic compounds and their properties. This will be a precursor for the study on Chemical Reaction Engineering.

UNIT I CARBOHYDRATES
Introduction – various definitions and classifications of carbohydrates – Preparation, Physical & Chemical properties, Structure and Uses of Monosaccharides (Glucose & Fructose) Interconversions – Aldo pentose to aldo hexose–Aldo hexose to aldo pentose- aldose to isomeric Ketose – Ketose to isomeric Aldose – Aldose to epimer

UNIT II HETEROCYCLIC COMPOUNDS
Preparation, Physical & Chemical properties and Uses of Pyrrole, Furan, Furfural, Tetrahydro Furan, Thiophene, Indole, Pyridine, Quinoline and Isoquinoline.

UNIT III PREPARATION OF SYNTHETIC INTERMEDIATES
Preparations of Benzil from benzyl aldehydes - Furfyl from furfural, Vanniline from catechol, Gramine from indole, N-acetyl-5- bromo indoline from indole, Salol from phenol, Alanine from propionic acid, Heteroauxin from indole - Uses, Preparation of Chloramphenicol - Uses

UNIT IV SYNTHETIC ORGANIC CHEMISTRY
Preparation and Synthetic utilities of Grignard reagent, Ethyl aceto acetate and Malonic ester.

UNIT V PHARMACEUTICAL CHEMISTRY
Synthesis of Malonyl urea, Phenacetin, Isoniazid, Para amino benzoic acid (PABA), Tryptophan Isopentaquine, chloroquine, Sulphanilamide and Sulphapyridine.

TOTAL : 45 PERIODS

TEXT BOOKS

REFERENCE BOOKS
OBJECTIVE

- To make the student acquire practical skills in the wet chemical and instrumental methods for quantitative estimation of nitrite in water, cement, oil, coal and Phenol.

LIST OF EXPERIMENTS

1. Determination of Redwood / Saybolt numbers, kinematic viscosity and viscosity index of Lubricating oils
2. Determination of flash point, fire point, cloud and pour point of oils
3. Determination of acid value and iodine value of oils
4. Determination of COD of water samples
5. Cement Analysis
   a. Estimation of silica content
   b. Estimation of mixed oxide content
   c. Estimation of calcium oxide content
   d. Estimation of calcium oxide by rapid method
6. Coal Analysis
   a. Estimation of sulphur present in coal
   b. Ultimate analysis of coal
   c. Proximate analysis of coal
7. Soap Analysis
   a. Estimation of total fatty acid
   b. Estimation of percentage alkali content
8. Flue gas analysis by Orsat’s apparatus
10. Determination of calorific value using bomb calorimeter
11. Determination of nitrite in water.

TOTAL: 60 PERIODS

OUTCOME

- Familiarization with equipment like viscometers, flash and fire point apparatus etc
- Familiarization of methods for determining COD
- Familiarization of a few simple synthetic techniques for soap

REFERENCE BOOKS

1. Environmental pollution analysis, S.M.Khopkar, New age international. 2011
COURSE OBJECTIVES

- To provide exposure to the students with hands-on experience on various Basic Engineering Practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP – A (CIVIL & ELECTRICAL)

1. CIVIL ENGINEERING PRACTICES

   PLUMBING
   - Basic pipe connections involving the fittings like valves, taps, coupling, unions, reducers, elbows and other components used in household fittings. Preparation of plumbing line sketches.
   - Laying pipe connection to the suction side of a pump.
   - Laying pipe connection to the delivery side of a pump.
   - Practice in connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

   WOOD WORK
   - Sawing, planing and making joints like T-Joint, Mortise and Tenon joint and Dovetail joint.

   STUDY
   - Study of joints in door panels and wooden furniture
   - Study of common industrial trusses using models.

2. ELECTRICAL ENGINEERING PRACTICES

   - Basic household wiring using Switches, Fuse, Indicator and Lamp etc.,
   - Stair case light wiring
   - Tube – light wiring
   - Preparation of wiring diagrams for a given situation.
   - Study of Iron-Box, Fan Regulator and Emergency Lamp

GROUP – B (MECHANICAL AND ELECTRONICS)

3. MECHANICAL ENGINEERING PRACTICES

   WELDING
   - Arc welding of Butt Joints, Lap Joints, and Tee Joints
   - Gas welding Practice.
   - Basic Machining - Simple turning, drilling and tapping operations..
   - Study and assembling of the following:
     a. Centrifugal pump
     b. Mixie
     c. Air Conditioner.

   DEMONSTRATION ON FOUNDRY OPERATIONS.

4. ELECTRONIC ENGINEERING PRACTICES

   - Soldering simple electronic circuits and checking continuity.
   - Assembling electronic components on a small PCB and Testing.
   - Study of Telephone, FM radio and Low Voltage Power supplies.

TOTAL: 60 PERIODS

COURSE OUTCOMES

- Ability to fabricate carpentry components and to lay pipe connections including plumbing works.
- Ability to use welding equipments to join the structures
- Ability to do wiring for electrical connections and to fabricate electronics circuits.