

**SYLLABUS PRESCRIBED FOR
FOUR YEAR DEGREE COURSE IN
BACHLOR OF TECHNOLOGY
(CHEMICAL TECHNOLOGY)
(FOOD, PETRO, PULP & PAPER, OIL & PAINT)
SEMESTER PATTERN
SEMESTER : FIRST**

1 SCT 1

APPLIED INORGANIC CHEMISTRY

SECTION-A

- UNIT I :** **Atomic structure** : Bohr's theory, Modern quantum theory of atom, deBroglie's equation, Exclusion Principle, Hunds rule, Aufbau principle, quantum number and distribution of electrons. Atomic size, ionization energy, factors determining ionization energy, electron affinity and electro negativity. (8)
- UNIT II:** **Chemical Bonds and their types** : ionic bond, covalent bond, metallic bond. Hydrogen bond, coordinate bond, odd electron bond, vanderwaals forces, lattice energy, Born Haber cycle, hybridization and molecular shapes, resonance. (7)
- UNIT III:** **Water** : Impurities in water and their effect on hardness, Estimation of hardness by EDTA and Soap solution method, softening of water, methods of softening : Lime Soda, Zeolite process and Ion Exchange method, problems based on Lime Soda & Zeolite process, industrial uses, boiler corrosion structure of water, concept of bond and free water. (7)

SECTION-B

- UNIT IV:** **Alloys:** Introduction, purpose of making alloys, composition, properties, different types of alloys, carbon steel, copper (Brass, Bronze), Nickel, Aluminum, Tin. (7)
- UNIT V:** **Corrosion:** Definition, factors affecting the rate of corrosion, different types of corrosion, cathodic and anodic protection, prevention against corrosion, protective coating, metallic, inorganic, organic coating and corrosion inhibitors. (7)
- UNIT VI:** **Cement:** Raw materials, compositions, manufacture, by wet and dry process , properties of cement, special cements.
Glass: Different kinds of glass, manufacture of glass color imparting on glass uses of glass.
Refractories: Classification, raw materials, manufactures, application in industry. (9)

TEXT BOOK:

1. Chemical Process Industries: R.N.Shreve, McGraw Hill, New York.

REFERENCE BOOKS:

1. Fundamental Concepts of Inorganic Chemistry: E.S.Gilbreath, McGraw Hill Kogukusha Ltd, International students edition.
2. Concise Inorganic Chemistry, J.D. Lee, Low Price Ed.
3. A Textbook on Engineering Chemistry: S.S.Dara.
4. Outlines of Chemical Technology .E.Dryden, East-west press New Delhi.
5. Basic Inorganic Chemistry, F.A.Cotton ,G.Wilkinson and P.L.Gaus, John Wiley & Sons, Inc, Singapore 3rd Ed,1996.

1 SCT 6

APPLIED INORGANIC CHEMISTRY

List of Experiments :

1. Determination of Normality and strength of Sodium hydroxide by Oxalic acid.
2. To determine the normality and strength of Hydrochloric acid by sodium hydroxide.
3. Determination of normality and strength of Oxalic acid by using potassium permanganate solution.
4. Determination of permanent NaOH and Na₂CO₃ in the given alkali mixture solution.
5. Determination of NaHCO₃ and Na₂CO₃ in the given alkali mixture solution.
6. Determination of hardness of water by using EDTA method.
7. Determination of free chlorine in a water sample.
8. Estimation of copper iodometrically using hypo solution.
9. Estimation of Zinc in the given sample.
10. Estimation of Iron from the given solution.
11. To estimate amount of Tin in the given stannous chloride solution.
12. To estimate the percentage of lime in cement.
13. To determine the amount of copper in given sample of brass.
14. To estimate the percentage of iron in plain carbon steel.

NOTE: At least EIGHT laboratory experiments mentioned above have to be performed.

1 SCT 7 / I A 6

ENGINEERING PHYSICS

Syllabus is same as I A 6 ENGINEERING PHYSICS, I / II Sem. B.E.

1 SCT 8 / I B 7

COMPUTER PROGRAMMING

Syllabus is same as I B 7 COMPUTER PROGRAMMING, I / II Sem. B.E.

2 SCT 3

ENGINEERING MECHANICS

Syllabus is same as per existing syllabus of 2 SCT 3 Applied Mechanics of I & II Semester B.Tech. (Chem. Tech.) {Polymer (Plastic), Food, Petro, Pulp & Paper, Oil & Paint}, Prospectus No. 031732.

2 SCT 4 / I A 4

ENGINEERING DRAWING

Syllabus is same as I A 4 Engg. Drawing, I / II Sem. B.E.

2 SCT 5

WORK SHOP

COURSE OBJECTIVES:

- To give students 'hands on experience' of craftsmanship.
- To make students familiar with different work trades.
- To develop quality & safety consciousness amongst the students.
- To develop awareness of fire safety amongst the students.
- To develop respect towards labour work amongst the students.
- To develop skill sets for creating entities from primitive engineering materials.
- To develop skill sets for establish in connections through wires and cables.
- This exercise also aims at inculcating respect for physical work and hard labour in addition to some value addition by getting exposed to interdisciplinary engineering domains.

A) PERFORMANCE:

I) SHEET METAL: Introduction to sheet metal tools, their use, different sheet metal joints, soldering, surface development. Specifications of metal sheets, Surface coatings; Operations like cutting, bending, folding, punching, riveting ; Joining by brazing and soldering.

One job on sheet metal: Job involving soldering operation, making, cutting, bending, joining operations of small parts using sheet metal like Tray, Funnel, Dust Bin, etc.

II) WELDING : Classification & brief introduction to welding processes - Arc, Gas and Resistance. Definition of welding, brazing and soldering processes, and their applications. Oxy-Acetylene Gas welding process, Equipment and Techniques, Type of flames and their applications. Manual metal arc welding technique and equipment, AC and DC welding Electrodes, constituents and functions of Electrode coating. Welding positions. Type of welding joint. Common welding defects such as cracks, undercutting, slag inclusions, porosity.

One job on welding: Job involving, edge preparation for Arc welding for different jobs like Lap welding of two plates, butt welding of two plates and welding to join plates at right angles.

III) CARPENTRY : Brief study of various hand tools like chisel, saw, planer. Timber, definition, engineering applications, seasoning and preservation, plywood and plyboards. Introduction, use of marking tools & hand tools such as marking gauge, try squares, steel rules, saws, jackplane, etc. Use of power tools, safety precautions.

One job on carpentry: Job involving a joint, wood sizing exercise in planning, marking, sawing, chiseling and grooving to make. Use and setting of hand tools like hack saw, jack plane, chisels and gauges for construction of various joints like T – Lap joint, Bridle joint , Corner mortise joint ,Dovetail / butt joint such as a tray, frame etc.

IV) FITTING: Introduction to different fitting tools. Use and setting of fitting tools for marking, center punching, chipping, cutting, filing, drilling, their use, different measuring tools, Files – Material and Classification.

One job on fitting: Job involving Fitting involving marking, filing, hacksaw cutting, drilling and tapping such as a male-female type pare.above mentioned operations.

B) DEMONSTRATION:

Minimum two physical demonstrations provided from following. In addition to physical demonstrations **Video / LCD** presentations for rest of demonstrations may be provided.

- 1) **SAFETY** : Common hazards while working with engineering equipment and related safety measures. Colour Codes floor marking in industries, various hazard indication signs. Posters for safety. Fire Safety, fire prevention precautions, necessity of fire fighting, fire extinguishers, rules of fire fighting, risk elements in fire fighting and demonstration of use of fire extinguishers.
- 2) **MATERIALS** : Brief introduction of materials used in Industries, steels and alloys, cast iron, non-ferrous metals, timber, plastics and polymers, glass etc. and; their applications.
- 3) **MEASURING INSTRUMENTS:** Brief introduction to instruments other than used in above performing trades. like –Vernier Caliper, Micrometer, Dial indicator, thickness gauge, height gauge, Their least counts, common errors and care while using them, Use of marking gauge, ‘V’ block and surface plate.
- 4) **MACHINE TOOLS AND PROCESSES:** Brief introduction to metal removing, Showing basic operations like plain turning facing, step turning etc. metal shaping,
- 5) **FOUNDRY:** Moulding sand, constituents and characteristics. Pattern, definition, materials, types, core printing. Role of gate, runner, riser, core and chaplets. Causes and remedies of some common casting defects like blow holes, cavities, inclusions. Demonstration to Preparation of sand mould like pipe flange, anvil, etc.
- 6) **SMITHY:** Introduction to smithy operations like upsetting, drawing, bending, Forming; Tools- hammer, hot and cold chisels, swages, drifts, flatters, tongs, anvils and various smithy tools & equipments, their use. Forging Principle, forge welding, use of forged parts.
- 7) **PLASTIC INJECTION MOULDING:** Introduction, principle, equipment & its operation, mould introduction & setting, Safety precautions and demonstration of plastic injection molding process.
- 8) **PLUMBING** : Use of plumbing tools, spanners, wrenches, threading dies, demonstration of preparation of a domestic plumbing line involving fixing of a water tap and use of coupling, elbow, tee and union etc.
- 9) **TAPS & DIES:** introduction to Taps & Dies, Different sizes of Taps & Dies their uses, Holding instruments of taps & dies. Demonstration involving, External and internal threads on plate or pipe , marking, center punching, cutting, filing, drilling.
- 10) **MASONRY:** Use of mason's tools like trowel, hammers, spirit level, square, plumb, line and pins etc. Demonstration of mortar making, single and one and half brick masonry, English and Flemish bonds, block masonry, pointing and plastering
- 11) **IT & COMPUTERS:** Introduction and identification of hardware components of a typical computer system. Handling and operating peripheral devices like printer, scanner, pen drives, CD-ROM, Multimedia Devices, UPS etc. Identification and study of communication elements like Single pair wires (phone lines), multi-pair wires (UTP), fibre-optic cables, printer data cables, connectors- RJ-45, RJ-9, RJ-11, USB, 9-Pin and 25-Pin serial and parallel connectors; converters- serial to USB, 9-Pin to 25- Pin, Vice-Versa and others. POST (power on self test), Power related problems. Use of CD Read / Write operations etc. Installation of Operating system windows and Linux , simple diagnostic exercises.

- 12) **ELECTRONICS:** Introduction to Active & Passive Electronic components. Demonstration and use of electrical and electronics hand and power tools. Measurement of resistor and capacitor, measurement of voltage and frequency using oscilloscope. Demonstration and performance measurement of any two electronic components / devices – Diodes, Transistor & Logic gates. Working of Remote Controller.
- 13) **CONSTRUCTION OF ELECTRICAL BOARD WIRING:** House wiring, staircase wiring for fluorescent tube light, store wiring, three-phase wiring for electrical motors & Machines. Working of Electrical Batteries, demonstration of electrical cable wires, starters and MCB's.
- 14) **PRINTED CIRCUIT BOARDS :** Layout drawing, +ve and -ve film making, PCB etching and drilling, tinning and soldering techniques. Assembly of Electronic components on the printed circuit board (PCB).
- 15) **GLASS BLOWING:** Definition of glass, Basic concepts of glass structure, Batch materials and minor ingredients and their functions, Elementary concept of glass manufacturing process, Different types of glasses. Application of glasses. Types of Glasses, Manufacturing & properties of Glasses. Demonstration of glass blowing.

REFERENCES :

1. B. S. Raghuvanshi, A Course in Workshop Technology, Vol – I, Dhanapat Rai and Sons.
2. Hajara Choudhari, Elements of Workshop Technology, Vol – I, Media Promoters.
3. Gupta and Kaushik, Workshop Technology, Vol – I, New Heights.
4. Chapman, Workshop Technology, Vol – I, The English Language Book Society.
5. H.S.Bawa, Workshop Technology, Vol.-I, TMH Publications, New Delhi.
6. K.T.Kulkarni, Introduction to Industrial Safety, K.T.Kulkarni, Pune Reference Books
7. Hwaiyu Geng, Manufacturing Engineering Handbook, McGraw Hill Publishing Co.Ltd.
8. Lawrence E.Doyle, Manufacturing Processes and Materials for Engineers, Prentice Hall Inc.
9. Mark Minasi, The complete PC upgrade and maintenance guide -- BPB. Publications
10. Elements of Ceramics - F.H Norton
11. Fundamentals of Ceramics - Barsoum

NOTE: Journal should prepared and submitted based on information of tools and equipments used, jobs prepared by using various tools, equipments, machines in the above three trades of performance sections. It also consist of details of demonstration (minimum two) demonstrated to students with brief description.

The term work shall be assessed based on a) the record of attendance, b) Term work done, c) the written/ practical / oral tests on the term work to decide the depth of understanding. The term work is to be assessed weekly.

PRACTICAL EXAMINATION:

Practical examination will consists of actual preparation of one job from any of the above performance sections. Duration of examination will be 3 hrs. Total marks are 25, out of which 15 marks are for job preparation and 10 marks for viva voce which should be conducted when the students are on job.

2 SCT 6

APPLIED PHYSICAL CHEMISTRY

List of Experiments

1. To determine the Surface tension of given sample by stalagmometer method.
2. To determine the viscosity of a given liquid by Ostwald viscometer.
3. To study the partition coefficient of iodine between organic solvent and water.
4. To study the hydrolysis of ethyl acetate in presence of sodium hydroxide.
5. To study the hydrolysis of an ester in presence of hydrochloric acid
6. To investigate the autocatalytic reaction between potassium permanganate and oxalic acid.
7. To determine energy of activation of the reaction between potassium persulphate and potassium iodide.
8. To determine the refractive index of given liquids by Abbe's refractometer.
9. Determine the specific and molar refraction of a given liquid by Abbe's refractometer.
10. Kinetic study of Second order reaction of equal concentration.
11. To Determination heat of neutralization HCl by NaOH.
12. To Determination the integral heat of solution of KNO_3
13. Determine the solubility of benzoic acid in water at different temperature and hence its heat of solution.
14. To study the effect of addition of an electrolyte on the solubility of monobasic organic acid at room temperature.

NOTE: At least EIGHT laboratory experiments mentioned above have to be performed.

2 SCT 7 / I B 8

ELECTRICAL ENGINEERING

Syllabus is same as I B 8 ELECTRICAL ENGINEERING, I / II Sem. B.E.

2 SCT 8

ENGINEERING MECHANICS

Practicals : Based on the syllabus 2 SCT 3 ENGINEERING MECHANICS

2 SCT 9 / I A 8

ENGINEERING DRAWING

Syllabus is same as I A 8 Engg. Drawing, I / II Sem. B.E.