

**SEMESTER-III**  
**M 3 IC 01-CT 09**  
**Speciality Polymer**

**Time: 3 Hrs.**  
**Credits: 4**

**M.M. 80 marks**

**Unit – I**

**High temperature and fire resistant polymer:** Introduction, Polymers for high temperature resistance, Fluoropolymer, Aromatic polymers, Hydrocarbon polymers, Polyethers, Polyphenyl sulphide, Polysulphones, Polyesters, Polyamides, Polyketones, Heterocyclic polymers.

**Hydrophilic Polymers:** Introduction, Natural polymers – Carbohydrate, Proteins, Semi-synthetic polymers, Hydrogel, Polyacrylamides hydrophilic polymers, Polyvinyl alcohol, Polyvinyl pyrrolidone.

**Unit – II**

**Polymers with electrical and electrometric properties:** Introduction, Conductive polymers, Photo conducting Polymer, Polymers with piezoelectric, Piezoelectric and ferroelectric properties, and Photo resists for semiconductor fabrication.

**Conducting Polymer:** Definition, Inherently conducting polymer: polyacetylene, polydiacetylene, polyaniline, poly (p-phenylene sulphide), photo conducting polymers

**Unit – III**

**Ionic Polymers:** Introduction, Classification, Synthesis physical properties and application, Ionomers based on polyethylene, Polystyrene, Ionomers with Polyaromatic backbones, Polyelectrolyte, Polyelectrolyte complexes

**Biopolymers:** Introduction, Definition, classification, advantages and disadvantages, Applications of Biopolymers in : 1) Drug delivery system, 2) Disposable in Health Care, 3) Packaging, 4) Medication

**Structure and properties of natural polymer:** - polypeptides Proteins nucleic acid, based, poly lactic acid, PHBV, Carbohydrates.

**Unit –IV**

**Inorganic and Organic Polymer:** Introduction, Inorganic reaction mechanism, Condensation organ metallic, polymers, Addition polymers, coordination polymers, Sol Gel, Portland cement, Silicates, Silicon dioxide, Asbestos, Diamond, Graphical, Polysulphur

### Unit-V

#### Outline manufacturing and properties of

|                        |                             |
|------------------------|-----------------------------|
| Polyethylene           | Polyimides                  |
| Polypropylene          | Polyacrylonitriles          |
| Polystyrene            | Polyvinyl alcohol           |
| Polymethylmethacrylate | Polyvinyl acetate           |
| Polyvinyl chloride     | Phenol formaldehyde resin   |
| Polyurethanes          | Urea formaldehyde resin     |
| Polyesters             | Melamine formaldehyde       |
| Polycarbonates         | Melamine formaldehyde resin |
| Polyamides             | Epoxy resins.               |

#### Recommended Books:

1. Polymer science: V.R. Goowarika,N.V. Viswanathan,Jayadev Sridhar
2. Text book of polymer science: Fred W. Billmeyer
3. Polymer science & Technology: Joel R. Fried
4. Polymer Science and Technology: Premamoy Ghosh
5. Specialty polymers: R.W. Dyson

**SEMESTER-III**  
**M 3 IC 02-CT 10**

**Industrial aspects of chemistry**

**Time: 3 Hrs.**

**M.M. 80 marks**

**Credits: 4**

**Unit-I**

**Fertilizers:** Introduction, types and synthesis of nitrogenous, ammonia based, phosphoric acid and phosphatic fertilizers.

**Unit-II**

**Glass and Ceramics:** Glass manufacture and different types of glasses, manufacture of fused, silica, safety and poetical glass, glass fibers, manufacture of ceramics and refractories, super refractories, insulating and pure oxide refractories, modern ceramics.

**Unit-III**

**Cement Industry:** Types of cement manufacture of Portland cement, composition, setting and hardening of cement, mortars and concrete, gypsum, plaster of paris, estimation of silica, alumina, calcium oxide and sulphates in Portland cement.

**Unit-IV**

**Silicates and mineral resources:** Feldspar, Asbestos, Mica talc, pyrophyllite and steatite, Zeolites, ultramarines.

**Unit-V**

**Explosives:** Classification, Characteristic, preparation of nitrocellulose-TNT, Picric acids, Dynamite-cordrate and Gunpowder, dynamites, HMX, PETN, Cyclonite, plastic explosives, gelatin, RDX, Cordite and seismic explosives, properpellants-manufacturing of liquid and solid properpellants-hydrazine, incendiaries and smoke screens and their industrial applications.

**SEMESTER-III**  
**M 3 IC 03-ET 01**

**Organic Reagents, Natural Products and colorants**

**Time: 3 Hrs.**

**M.M. 80 marks**

**Credits: 4**

**Unit-I**

**Reagents in organic synthesis:** Use of the following reagents in organic synthesis and functional groups transformation, Gilman's reagents, lithium dimethyl cuprate, LDA, Dichlorohexylcarbodiimide, trimethyl silyl iodide, Tributyltinhydride, DDQ, Baker yeast, Petersons synthesis, Merrifield resins, 1,3 dithiane, selenium oxide, Osmium tetroxide. Reagents containing phosphorous, silicon and borons and organic synthesis: preparation, properties, applications and mechanistic details.

**Unit-II**

**Dyes:** Introduction, classification, color and chemical constitution of dyes. Chemistry of Azodyes, anthraquinone dyes, Indigoid and disperse dyes.

**Unit-III**

**Paints:** History, components: binder, vehicle, solvent, additives; colour changing paint, applications, product variants.

**Pigments:** History, manufacturing and industrial standards, scientific and technical issues, swatches, biological pigments, pigments and chemical composition.

**Unit-IV**

**Alkaloids:** Definition, nomenclature and physiological action, occurrence, isolation, general methods of structure elucidation, degradation, classification based on nitrogen heterocyclic ring, role of alkaloids in plants, structure, stereochemistry, synthesis and biosynthesis of following – Ephedrine, (+) – Coniine, Nicotine, Atropine, Quinine and Morphine.

**Porphyryns:** Structure and synthesis of haemoglobin and chlorophyll.

**Unit-V**

**Steroids:** Occurrence, nomenclature, basic skeleton, Diel's hydrocarbon and stereochemistry, isolation, structure determination and synthesis of Cholesterol, Bile acids, Androsterone, Testosterone, Estrone, Progesterone, Aldosterone, biosynthesis of steroids.

**SEMESTER-III**  
**M 3 IC 04-ET 02**

**Principals of Chemical Engineering**

**Time: 3 Hrs.**  
**Credits: 4**

**M.M. 80 marks**

**Unit-I**

**Concept of unit operation and unit process:** Application of thermodynamics in unit process, combustion reaction, theoretical air, excess air, air fuel ratio, analysis of products of combustion, internal energy and enthalpy of reaction, heating value of fuels, enthalpy of formation, adiabatic flame temperature, entropy changes for reactive mixtures.

**Unit-II**

**Chemical process kinetics:** Types of chemical reactions, catalytic rate equations, adsorption-equations, factors affecting a chemical process, reactor shape and effect of back mixing on products distribution, selection and sizing of homogeneous and catalytic reactor.

**Unit-III**

**Heat Transfer:** The nature of heat flow, steady flow of heat in homogeneous body, series resistance to flow of heat, concept of the film, overall coefficients, magnitude of heat transfer coefficients and fouling factors, heat exchange concepts in scale up, heat exchangers.

**Unit-IV**

**Mass Transfer:** Different modes of mass transfer, concentration, various velocities and fluxes, Fick's law of diffusion.

**Unit-V**

**Separation Process:** Characteristics of separation process phase equilibrium separation-on, two and three components, separation factors, selection of a separation process.

**SEMESTER-III**  
**M 3 IC 05-ET 03**

**Medicinal Chemistry-I**

**Time: 3 Hrs.**

**M.M. 80 marks**

**Credits: 4**

**Unit-I**

**Drug Design:** Rational approach to drug design, methods of variation, tailoring of drugs.

**Physical and Chemical factors:** factors governing the biological activities of drugs, physical properties, dissociation constants, chemical properties, isosterism and bio-isosterism.

**Unit-II**

**Antipyretics and Analgesics :** Salol, Cinchophen, Aminopyrine, Livorphanol, Peethidine.

**Antivirals:** Methisazone, Idozuridine.

**Unit-III**

**Hypnotics and Sedatives:** Barbiturates, Phenobarbitone, Nitrazepam, Gluethimide and their mode of action.

**CNS stimulants:** Caffeine, Ethamivan, Phentermine, and their mode of action.

**Unit-IV**

**Cardiovascular agents:** Introduction, Classification, Cardic glycosides, antihypertensive and hypotensive drugs, antiarrythanic agents, Vasopressor drugs, resin angiotensin pathway.

**Antihistaminics:** Classification, structure activity relationship and synthesis of promethazine, Phenindamine, Chlorophenamine.

**Unit-V**

**Antimalarials:** Classification, quinine, 4-amino-quinoline and 8-aminoquinoline analogues, guanidines, biguanides, pyrimidine drugs, miscellaneous drugs.

**Antibiotics:** Introduction, Classification,  $\beta$ -lactam antibiotics, penicillines, cephalosporins, chloramphenicol, tetracyclines.

**SEMESTER-III**  
**M 3 IC 05-CP 05**

(Practical-A-III)

**Credits 4; Time 8h**

**M.M. 100**  
**80 marks (External)**  
**20 marks (Internal)**

**Polymer Synthesis**

- 1 Preparation of Urea formaldehyde resins
- 2 Preparation of Phenol formaldehyde resins
- 3 Preparation of Thiol rubber
- 4 Preparation of Condensation polymer
- 5 Preparation of Epoxy resin
- 6 Preparation of Polymerisation of acrylonitrile
- 7 Preparation of Solution polymerization of vinyl acetate
- 8 Preparation of free radical polymer

**Characterization of polymers**

- 1 Determination of MP, strong time and gel time of phenolic resins.
- 2 Determination of molecular weight by amine and group analysis.
- 3 Determination of viscosity of polymer by Ubelod viscometer and hen's M.W.
- 4 Determination of Ash content.
- 5 Determination of specific gravity of prepared polymer/resin.
- 6 Determination of acid value of plastic material.
- 7 Determination of saponification value of plastic material.
- 8 Determination of iodine value of plastic material.
- 9 Determination of hydroxyl value of plastic material.
- 10 Determination of carbonyl value of plastic material.
- 11 Determination of molecular weight of polymer.
- 12 Determination of capacity of a cation exchange value of polymer.
- 13 Determination of capacity of an anion exchange value of polymer.

## **SEMESTER-III**

### **M 3 IC 06-EP 01**

(Practical-B-III)

**Credits 4; Time 8h**

**M.M. 100**

**80 Marks (External)**

**20 Marks (Internal)**

#### **Chromatography**

- 1 Separation of components of tablet using preparative TLC and identification by FTIR and UV-VIS spectroscopy.

#### **Extraction**

- 1 Extraction of caffeine from Vivarin.
- 2 Extraction of Nicotine from tea leaves
- 3 Extraction of casein from milk
- 4 Extraction of piperidine from pepper.

#### **Titrimetric estimation of drugs**

- 1 Estimation of paracetamol
- 2 Estimation of Ascorbic acid
- 3 Estimation of Aspirin
- 4 Estimation of Sulpha Drugs
- 5 Estimation of Benzocaine