

CH 101 BS

APPLIED CHEMISTRY
(For BME only)

Instruction	: (3L+1T) Hours/Week
Duration of SEE	: 3 Hours
SEE	: 70 Marks
CIE	: 30 Marks
Credits	: 4

Course Objectives:

To provide students with knowledge of applied chemistry for building technical competence in Industries, Research and Development in the following fields:

- Electrochemistry
- Engineering Materials
- Carbohydrates and Proteins
- Osmosis and Alloys
- Organic reactions and synthesis of Drug molecules

Course Outcomes:

- It is possible to estimate the amounts of substances present in the given solution from the measurement of conductance, emf and P^H of the solution.
- Gain knowledge in the concept and applications of various types of batteries.
- From the knowledge of permeability, the student can develop different membrane for different purposes.
- They learn the concept and applications of Dialysis, Electro dialysis, Plasmolysis and Ultrafiltration.

UNIT-I

ELECTROCHEMISTRY:(10L) Electrolytic conductors-conductance, specific conductance, equivalent conductance and molar conductance. Cell constant, measurement of electrolytic conductance. Effect of dilution on various conductivities. Kohlrausch law and its applications – determination of Λ_{∞} of weak electrolytes, solubility product and degree of dissociation. Principle and applications of conductometric titrations. Numerical problems.

Electrolytic and galvanic cells, cell notation, concept of electrode potential, single electrode potential and its determination. Electrochemical series and emf calculations. Types of electrodes- Hydrogen, Calomel, Quinhydrone and Glass electrode. Nernst equation and its applications. Determination of pH by using Quinhydrone and Glass electrodes. Principle and applications of Potentiometric titrations. Numerical problems.

UNIT-II

ENGINEERING MATERIALS: (10L)

Ceramics: Introduction and classification.

i) Refractories: Definition, classification and properties: Refractoriness, RUL test, Porosity and thermal spalling. Engineering Applications of refractories.

ii) Glasses: General properties of glass, Types of glasses and their uses.

iii) Whitewares: Manufacture and uses of whitewares. Glazing-purpose and methods of glazing.

Polymers: Introduction. Classification of polymers based on their final usage-Plastics, Fibers and Elastomers.

Preparation, properties and engineering applications of

Plastics: PVC and Bakelite

Fibers: Nylon 6:6, and Dacron.

Elastomers: Natural and artificial rubber, vulcanization of natural rubber.

Preparation, properties and uses of Buna-S and Buna-N rubbers

Composites: Introduction. Constituents and characteristics of composites. Types of composites-Reinforced, Particulate and Layered composites. Applications of composites.

UNIT-III

Carbohydrates and Proteins:(10L) Classification of carbohydrates – mono, oligo, polysaccharides. General properties of monosaccharides, aldoses and ketoses. Reactions of glucose and fructose. Establishment of open chain structure (Configuration not necessary)

Di-saccharides: Sucrose, Maltose and their reactions. Reducing/non reducing sugars. Polysaccharides: starch, cellulose, importance of cellulose citrate, acetate, xanthate.

Amino acids and Proteins: Classification of amino acids, neutral, acidic, basic and essential amino acids. Nomenclature, methods of preparation- Strecker's synthesis, Gabriel phthalimide synthesis and properties. Zwitter ion and iso-electric point. Peptide, peptide linkage, proteins, importance, classification, general properties and colour tests of proteins.

UNIT-IV

Osmosis &Alloys:(8L) Colligative properties, osmosis and osmotic pressure, Berkeley-Hartley method for determination of osmotic pressure, isotonic, hypotonic & hypertonic solutions. Plasmolysis, Dialysis, Electrodialysis and Ultrafiltration.

Alloys: Solid solution, interstitial alloys, intermetallic compounds.

Hume-Rothery rules. Composition, properties and uses of copper alloys, stainless steel, titanium and tantalum alloys.

UNIT-V

Organic reactions and synthesis of drug molecules (8L)

Organic Reactions: Introduction to Addition, Substitution and Elimination reactions. Addition to C=C and C=O, Nucleophilic substitution in aliphatic system: SN¹ and SN² mechanism, Elimination reactions: E¹ and E² mechanism.

Drugs: Definition and classification. Preparation and uses of commonly used drugs- Paracetamol, Aspirin and Ibuprofen.

Suggested Readings:

1. PL Soni, OP Dharmara, *Text book of Physical Chemistry*, Sultan Chand & Co, 22nd Edition(2001).
2. Debjyothi Das, *Bio-physics and Bio-Physical Chemistry*, Academic Publishers(1999).
3. Arun Bahl and BS Bahl, *A text book of Organic Chemistry*, S.Chand Co. Ltd., 16th Edition(2002).
4. David Krupadanam, *Drugs*, University Press.