With effect from the academic year 2015-2016

BS 204 CH

APPLIED CHEMISTRY
(For BME II Semester)
Credits: 3

Instruction: (3L) hrs per week **Duration of SEE: 3 hours**
CIE: 30 marks **SEE: 70 marks**

Objective:

- To study the various types of conductances, elactrodes & cells
- To study the classification, journal properties and importance of Carbohydrates, Amino acids & Proteins
- To know the concept of Membrane Chemistry, Bio-energetics, Chemical Potential.Biochemist &Physical chemist standard states.

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, Electrodialysis, Plasmolysis and Ultrafilteration.

Unit– I : <u>ELECTROCHEMISTRY:</u>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:BATTERY TECHNOLOGY: Primary batteries: Zin–Carbon battery. Secondary batteries: Lead-acid battery, Nickel-Cadmium battery-charging and discharging reactions and its applications. Modern Lithium batteries, advantages and applications.
Solar Cells: Concept of Solar energy conversion, Photo- Voltaic cells.
Fuel Cells: Concept of fuel cells and their advantages. H_2-O_2 alkaline fuel cell and methanol-Oxygen fuel cell.

Unit–III:Carbohydrates and Proteins: Classification of carbohydrates – mono, oligo, poly saccharides. 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- Streckers synthesis, Gabriel pthalimide synthesis and properties. Zwitter ionand iso-electric point.

Peptide, peptide linkage, proteins, importance,classification, general properties and colour tests of proteins.

Unit–IV:Osmosis&Alloys: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:Membrane Chemistry: Structure of cell, open system, concept of bioenergetics chemical potentials, biochemist's and physical chemist's standard state. Gibbs-Donnan membrane equilibrium, Gibbs-Donnan effect and its relation to the salt concentration, pH, osmotic pressure and trans-membrane potentials and applications. Structure of biological membranes, bi-layer theory of fluid mosaic model.

Permeability and membrane transport, simple facilitate and active transport coupling of reactions. Active membrane transport, sodium potassium pump, membrane potentials, ionic fluxes, Nernst potentials, origin of membrane potential, recording of membrane potentials and micro electrodes.

Suggested Readings:

1. PL Soni, OP Dhrmara, *Text book of Physical Chemistry*, Sultan Chand & Co, 22^{nd} 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., 16^{th} Edison(2002).

With effect from the academic year 2015-2016

BS 253 CH

APPLIED CHEMISTRY LAB
(For BME II semester)
Credits: 1

Instruction: 2 hrs per week **Duration of SEE: 2 hours**
CIE: 25 marks **SEE: 50 marks**

1. **Identification of the functional group in the given organic compound by qualitative test:**
   - i) Carboxylic acids
   - ii) Phenols
   - iii) Amines
   - iv) Aldehydes and ketones
   - v) Carbohydrates
2. **Preparation of the following Organic Compounds:**
   - i) Acetanilide
   - ii) Aspirin
   - iii) Azo-dye
   - iv) Benzyalidene aniline

3. **Acid-base titrations using the following instruments**
   - i) Conductivity meter
   - ii) pH meter
   - iii) Potentionmeter

4. **Estimation of Glucose by Colorimetry.**

Suggested Readings:

1. PG Mann, BC Saunder ,*Practical Organic Chemistry,* Orient Longman Ltd, 4th Edition. (1999).
2. BD Khosla, A. Gulati, *Senior Practicla Physical Chemistry*,VC Garg, Chand & Co, 10th Edition(2001).
