III B.Sc. ANALYTICAL CHEMISTRY

SEMESTER -VI

SYLLABUS

PAPER – 6: ELECTROANALYTICAL TECHNIQUES

Unit-I:

ELECTROCHEMISTRY AND ITS APPLICATIONS 12 Hrs.

1. Resistance, Ohm's law, conductance, cell constant, Specific conductance
2. Types of Electroanalytical techniques
3. Conductometric titrations: Principle and Applications of conductivity measurements
4. Different types of Conductometric titrations:

i. Strong acid Vs. Strong base

ii. Strong acid Vs. Weak base and

iii. Weak acid Vs. Strong base, etc.,

4. Electrochemical cells
5. Electrode potentials, cell potentials
6. Nernst equation, Determination of EMF of a cell
7. Potentiometric titrations: Principle and applications
8. Potentiometric Determination of Fe (II) Vs. Cr (VI) and Fe (II) Vs. Mn (VII)

Unit-II:

A. ION SELECTIVE ELECTRODES: 12 Hrs.

1. Ion selective electrodes: Introduction and their importance in chemical analysis
2. Reference electrodes – Hydrogen electrode, Calomel electrode, silver chloride electrode.
3. Indicator electrodes –Hydrogen and glass electrodes, Metal –metal ion electrode, inert electrode
4. Applications of ion selective electrodes: Qualitative and Quantitative determinations

B. pH METRIC TITRATIONS: Principle, Instrumental components and Applications of pH metric titrations

Unit-III:

A.POLAROGRAPHY: 12 Hrs

1. Introduction and Basic Principles of Polarography
2. Residual current, migration current, diffusion current, half wave potential and Ilkovic equation.
3. Instrumentation and techniques of Polarography technique.
4. Dropping mercury electrode (DME), advantages and disadvantages of DME
5. Qualitative and quantitative analysis of inorganic ions by Polarography techniqueS.

Unit-IV

A. COULOMETRY: 12 Hrs.

1. Introduction and Principles of Coulometry
2. Types of Coulometric methods: Potentiostatic and amperostatic coulometric methods
3. Principle, instrumentation and applications of Potentiostatic coulometric method
4. Principle, instrumentation and applications of amperostatic coulometric method
5. Principle and applications of Voltammetry
6. Principle and applications of Electrogravimetry.

UNIT V

AMPEROMETRY: 12 Hours

Principle, Titration apparatus, operating procedure, advantages and disadvantages of amperometric titrations, applications. Determination of ions of halogens.

Reference Books:

1. Quantitative chemical analysis by Vogel's; 6th & 7th Editions
2. Fundamentals of Analytical Chemistry by Skoog and West
3. Principles of Instrumental Analysis by Skoog and Holler
4. P.W. Atkins: Physical Chemistry.
5. G.W. Castellan: Physical Chemistry.
6. C.N. Banwell: Fundamentals of Molecular Spectroscopy.
7. Brian Smith: Infra-red Spectral Interpretations: A Systematic Approach.
8. W.J. Moore: Physical Chemistry

III B.Sc. ANALYTICAL CHEMISTRY

SEMESTER -V

PAPER -6: ELECTROANALYTICAL TECHNIQUES

PRACTICAL SYLLABUS

1. Determination of concentration of HCl Vs. NaOH by using Conductometric titration method
2. Determination of concentration of CH3COOH Vs. NaOH by using Conductometric titration method
3. Determination of Fe (II) with Cr (VI) by using Potentiometric titration method.
4. Determination of Fe (II) with Mn (VII) by using Potentiometric titration method.
5. Determination of Acidity of water samples by using pH metric titration method
6. Determination of Alkalinity of water samples by using pH metric titration method

MODEL PAPER

III B.Sc. ANALYTICAL CHEMISTRY

SEMESTER -VI

PAPER – 7: POLYMER CHEMISTRY

TIME: 3 HOURS Max. Marks. 75 Marks

Section – A

Answer any FIVE questions. Each question carries 5 Marks 5 x 5 = 25 Marks

1. Write about the classification of polymers?
2. Write about the plastics, Elastomers and Fibres?
3. Explain the Thermoplastics and thermosetting plastics?
4. Write bout the number average molecular weight?
5. Explain the determination of molecular weight of polymers by Osmometry?
6. Explain the preparation and properties of Terylene?
7. Write the drawbacks of raw rubbers?
8. Write about thermocoal?

Section – B

Answer all questions. Each question carries 10 Marks 5 x 10 = 50 Marks

9. Write in detail about Addition Polymerization? (OR)
   Write about the mechanism of Zeigler- Natta polymerization?
10. Explain the Free radical polymerization mechanism? (OR)
    Write about the Bulk and suspension polymerization techniques?
11. Write in detail about the different types of polymer additives.? (OR)
    Explain the following colourant, blowing agents and cross liking agents?
12. Explain the preparation and application of polyethylene and PVC? (OR)
    Explain the preparation and applications of Nylon 6,6 and Poly acrylonitrile?
13. Explain the manufacturing process of Buna – S rubber? (OR)
    Explain the following 1. Foam rubber 2. Sponge rubber?

III B.Sc. ANALYTICAL CHEMISTRY

SEMESTER -VI

SYLLABUS

PAPER – 7: POLYMER CHEMISTRY

UNIT-I: 12 Hrs.

INTRODUCTION TO POLYMERS

Basic definitions, degree of polymerization, classification of polymers- Natural and Synthetic polymers, Organic and Inorganic polymers, Thermoplastic and Thermosetting polymers, Plastics, Elastomers, Fibres and Resins, Linear, Branched and Cross-Linked polymers, Addition polymers and Condensation Polymers, mechanism of polymerization. Free radical, ionic and Zeigler – Natta polymerization.

UNIT-II: 12 Hrs.

TECHNIQUES OF POLYMERIZATION:

Techniques of Polymerization: Bulk polymerization, solution polymerization, suspension and Emulsion polymerization. Molecular weights of polymers: Number average and weight average molecular weights Determination of molecular weight of polymers by Viscometry, Osmometry and light scattering methods.

UNIT-III: 12 Hrs.

POLYMER ADDITIVES:

Introduction to plastic additives – fillers, Plasticizers and Softeners, Lubricants and Flow Promoters, Anti-aging additives, Flame Retardants, Colourants, Blowing agents, Cross linking agents, Photo stabilizers, Nucleating agents.

UNIT-IV: 12 Hrs.

POLYMERS AND THEIR APPLICATIONS:

Preparation and industrial applications of Polyethylene, Polyvinyl chloride, Teflon, Polyacrylonitrile, Terylene, Nylon6.6 silicones

UNIT – V 12 Hrs

RUBBERS: Types pf rubbers, drawbacks of rubbers, vulcanisation of rubber, synthetic rubber, Buna- S rubber, neoprene rubber, butyl rubber, polyurethane rubber, sponge rubber, foam rubber, rubber cement, thermocoal, applications of rubbers.

Reference Books:

1. Quantitative chemical analysis by Vogel's; 6th & 7th Editions

2. Fundamentals of Analytical Chemistry by Skoog and West

3. Principles of Instrumental Analysis by Skoog and Holler

4. P.W. Atkins: Physical Chemistry.

5. G.W. Castellan: Physical Chemistry.

6. C.N. Banwell: Fundamentals of Molecular Spectroscopy.

7. Brian Smith: Infra-red Spectral Interpretations: A Systematic Approach.

8. W.J. Moore: Physical Chemistry

PRACTICALS :

1. Determination of acid value of plastics.
2. Determination of saponification value of plastics
3. Preparation of phenol formaldehyde
4. Preparation of urea formaldehyde.
5. Determination of molecular weight of polystyrene from viscosity measurements

MODEL PAPER

III B.Sc. ANALYTICAL CHEMISTRY

SEMESTER -VI

PAPER – 6: POLYMER CHEMISTRY

TIME: 3 HOURS Max. Marks. 75 Marks

Section – A

Answer any FIVE questions. Each question carries 5 Marks 5 x 5 = 25 Marks

1. Stata and explain Ohms law?
2. Write briefly about types of electroanalytical techniques?
3. Explain the Nernst equation and its significance?
4. What are ion selective electrodes? Write their importance?
5. Write about Calomel electrode?
6. Explain the Residual current and diffusion current?
7. Write the procedure of amperometric titration?
8. Write the application of amperometric titration?

Section – B

Answer all questions. Each question carries 10 Marks 5 x 10 = 50 Marks

9. Explain Conductometric titrations with applications? (OR)
   Write in detail about potentiometric titrations?
10. Write about Electrochemical cells? (OR)
    Explain the principle, instrumental components and applications of pH titrations?
11. Write about the reference electrodes.? (OR)
    Explain about the indicator electrodes?
12. Explain the principle and instrumentation of Polarography? (OR)
    Write about the DME. Write its advantages and disadvantages?
13. Explain principle, instrumentation of amperometry? (OR)
    Explain the determination of halogens in amperometry?