BSC23SE102

BSC Semester- 1

Basics of Analytical Chemistry

Unit 1 : Chemistry Laboratory

Introduction: General introduction to chemistry lab, safety rules and precautions in chemistry laboratories, storage, ventilation, lighting, fumes, cupboard, hazards, precautions, maintenance of laboratory, definition of equipment/ apparatus, cleaning of laboratories, apparatus and preparation room. Lab Apparatus (A) Glass apparatus Beaker, test tube, boiling tube, conical flask, filtration flask, round bottom flask, flat bottom flask, funnel, separating funnel, watch glass, measuring cylinder, Petridis, desiccators, measuring cylinder, glass rod, glass tube. (B) Volumetric and Heating apparatus Volumetric apparatus: Volumetric flask, burette, pipette, analytical balance, electronic balance. Heating apparatus: Bunsen burner, water bath, sand bath, hot air oven, heating mantle (C) Miscellaneous Apparatus Buchner funnel, burner, test tube stand, tong, burette stand, clamp, china dish, wire gauze, cork, vacuum pumps, crucibles, clay pipe triangle, pestle and mortar, spatulas, thermometer, pH meter, Kipp's apparatus.

Unit 2 : Laboratory Reagents and Solvents Reagents

Classification of reagents according to their action; (i) acids (ii) bases (iii) salts (iv) complexing agents (v) oxidizing and reducing agents (vi) precipitating agents (vii) chelating agents. Each type to be explained with at least one suitable example. Primary and secondary standards: Definition, characteristics, uses examples for different types of reactions. Solvents: Solute, Solvent & Solution, classification of solvents (i) Protic and aprotic (ii) Acidic, basic amphiprotic and neutral (iii) Aqueous and non-aqueous (iv) Polar and non polar. Each type is to be explained with at least one example.

Unit 3 : **Solution Preparation**

Solutions, components of a solution, types of solution, solubility, concentration terms - percentage, ppm, ppb, g/L, molarity, normality, molality, calculation of masses and volumes for preparation of solutions and their practical approach.

Physicochemical Principles used in Chemistry Laboratory Ostwald dilution law, common ion effect, solubility product, precipitate, residue, precipitation, Le Chatelier’s principle

Recommended Texts:

1. Vogel, Arthur I: A Test book of Quantitative Inorganic Analysis (Rev. by GH Jeffery and others) 5th Ed. The English Language Book Society of Longman

2. Willard, Hobert H. et. al: Instrumental Methods of Analysis, 7th Ed. Wardsworth Publishing Company, Belmont, California, USA, 1988.

3. Christian, Gary D; Analytical Chemistry, 6th Ed. New York- John Willy, 2004.

4. Harris, Daniel C, Quantitative Chemical Analysis, 3 rd Edition, W.H. Freeman and Company, New York, 2001.

5. Khopkar, S.M. Basic Concepts of Analytical Chemistry New Age, International Publisher, 2009.

6. Koogs, West and Holler, Fundamentals of Analytical Chemistry, 6 th Edition, Sauders College Publishing, New York. 1991.

B. Sc. - Semester – II

SKILL ENHANCEMENT COURSE

Instrumentation: Measurement and Analysis (Credit-2)

UNIT – 1: Vernier Calipers and Micrometer Screw

1. **Vernier Calipers**
   - Introduction
   - Theory, Figure and Description of the instrument
   - Detailed study of least count, Error, Types of Error
   - Determination of magnitude of Errors
   - Limitations of Vernier Calipers
   - Applications of Vernier Calipers
2. **Micrometer Screw**
   - Introduction
   - Theory, Figure and Description of the instrument
   - Definition of Pitch and its determination
   - Study of least count, Error, Types of Error
   - Determination of magnitude of Errors
   - Limitations of Micrometer screw
   - Applications of Micrometer screw

UNIT – 2: Traveling Microscope and Spectrometer

1. **Traveling Microscope**
   - Introduction
   - Construction and Main parts of Traveling Microscope
   - Vertical and Horizontal Scale
   - Least count of Traveling Microscope
   - Applications of Traveling Microscope
   - Precautions to be taken in measurement
   - The Gray code
2. **Spectrometer**
   - Introduction
   - Description of the instrument
   - Construction and explanation of three main parts of spectrometer
   - Light Sources: Mercury discharge lamp, Sodium discharge lamp
   - Study of least count
   - The adjustment, Leveling and recording of observation
   - Applications of spectrometer

➢ **Reference Book:**

1. Fundamentals of Vernier Calipers and Screw Guage by Rajesh Mishra
2. Basics in Metrology and Measurements by Dr R. Venkat Reddy