

# **PG DEPARTMENT OF CHEMISTRY**

## **THEORY-OPEN ELECTIVE**

### **SELECTED TOPICS IN CHEMISTRY**

**Course Code: CHE**

**Paper Code: CHC 030**

**Course Outcomes:**

After studying this course, the student to:

CO1: Gain knowledge on importance of chemistry or different branches of chemistry.

CO2: Acquire knowledge about the use of chemistry in everyday life.

CO3: Get knowledge about the extraction and purification techniques.

CO4: Learn importance of metals in biology; natural products and also various physical aspects.

#### **UNIT – I**

**Solvent extraction:** Basics of solvent extraction principal and application of solvent extraction.

**Purification techniques:** Crystallization, fractional crystallization, distillation techniques (simple distillation, steam distillation, distillation under reduced pressure, fractional distillation).

**Chromatography:** Definition, terms, classification of chromatographic techniques, principles of column and planar chromatography

**Column chromatography:** gas chromatography, high performance liquid chromatography, ion exchange chromatographic method.

**Planar chromatography:** Paper chromatography and TLC principles, mechanism of separation and application.

**Electrophoretic methods:** principles, definition, terms, types and applications.

**[16 HOURS]**

#### **UNIT – II**

**An overview of metals in Biology:** Introduction, the element content of living systems, biological chemistry of hydrogen, the economical use of resources- abundance and availability. Biological need for and the behaviors of inorganic elements.

**Basic coordination chemistry for biologists:** Introduction, ionic bonding, covalent bonding, coordination geometry, crystal field and ligand field theory.

**Metal assimilation pathways:** Introduction, metal assimilation in bacteria, plants, fungi and in mammals (iron, copper and zinc).

**Metals in medicine:** Introduction, *cis*-platin, radioactive pharmaceuticals, lithium compounds in therapy.

[16 HOURS]

### UNIT – III

**Chemistry of natural products:** Carbohydrates (classification and structure of glucose, fructose, galactose, sucrose, maltose and lactose, carbohydrates as source of energy and breakdown process.

**Proteins:** amino acids classification and structure of  $\alpha$ -amino acid, zwitter ion, isoelectric point and its determination by electrophoretic method, Elementary aspect of primary and secondary structures.

**Vitamins:** Classification, importance of vitamin A, D, E, K, B & C.

[16 HOURS]

### UNIT – IV

**Thermodynamics:** First and second laws of thermodynamics. Concept of entropy and free energy, entropy as a measure of unavailable energy. Entropy and free energy changes and spontaneity of process. Variation of free energy with temperature and pressure. **Chemical kinetics:** Factor affecting the rate of reaction. Order of reaction and its determination. Energy of activation and its determination. Assumption of activated complex theory. **Electrochemistry:** Arrhenius theory of strong and weak electrolytes. Assumptions of Debye-Huckel theory of strong electrolytes. Electrode potential and construction of electrochemical cells. Corrosion and its prevention. **Photochemistry:** Laws of photochemistry, quantum yield and its determination, photodegradation.

[16 HOURS]

#### **References:**

1. Arthur I Vogel, Elementary Practical Organic Chemistry, Part I, II and III, CBS Publishers and Distributors, New Delhi, India.
2. I.L. Finar, Organic Chemistry, ELBS Longmann, Vol. I and II, 1984.
3. S K. Ghosh, Advanced General Organic Chemistry, Book and Allied (P) Ltd, 1998.

4. Organic Spectroscopy, William Kemp, English Language Book society, Macmillan, 1987.
5. Application of Absorption Spectroscopy of Organic Compounds, John R. Dyer, Prentice Hall of India Private Ltd., New Delhi, 1974.
6. Spectrometric Identification of Organic Compounds, 4<sup>th</sup> edition, Robert M. Silverstein, G. Clayton Bassler and Terence C. Morrill, John Wiley & Sons, New York, 1981.
7. Basic Inorganic Chemistry- 3<sup>rd</sup> edition, F.A. Cotton, G. Wilkinson and P.L. Gaus, John Wiley and Sons, (2002).
8. Inorganic Chemistry Principles of Structure and Reactivity: James E. Huheey, Ellen A. Keiter, Richard L. Keiter, Okhil K. Medhi, Delhi University, New Delhi (2006)
9. Elements of Physical Chemistry – Lewis and Glasstone.
10. Physical Chemistry by P.W. Atkins, ELBS, 4<sup>th</sup> edition, Oxford University Press (1990).
11. Basic Physical Chemistry by W.J. Moore, Prentice Hall, New Delhi, (1986).
12. Physical Chemistry – G.M. Barrow, McGraw Hill International Service (1988).