

SEMESTER III

PAPER III : BIOPHYSICAL AND BIOANALYTICAL TECHNIQUES – I

UNIT I

Units of measurement of solutes in solution. Eg. Normality, Molality, Molarity, and Milliosmol, Ionic strength. Examples of this concept.

pH, pOH, Henderson – Hasselbalch Equation, Buffers, pH of body fluids, Buffers in body fluids, red blood cells and tissues. Measurement of pH by indicators, Colloids and their applications, viscosity, Surface tension and Donnan Membrane Equilibrium.

UNIT II

ELECTROCHEMICAL TECHNIQUES:

Principles of electrochemical techniques Measurement of pH by glass electrode and Hydrogen electrode

Oxygen electrode – principle, operation of Clark electrode, applications of Oxygen electrode

UNIT III

CENTRIFUGATION TECHNIQUES:

Basic principles of centrifugation. Differential, Density gradient, Isopycnic and equilibrium centrifugation. Preparative and Analytical ultracentrifugation techniques. Determination of molecular weight by centrifugation method (Derivation included)

UNIT IV

CHROMATOGRAPHIC TECHNIQUES:

General principles of chromatography.

Principles, operational procedure and applications of

- o Paper chromatography
- o Thin layer chromatography
- o Ion exchange chromatography
- o Molecular sieve chromatography
- o Affinity chromatography
- o Gas liquid chromatography
- o HPLC

UNIT V

Autoradiography and isotope dilution techniques

Atomic structure, radiation, types of radioactive decay, half-life, units of radioactivity.

Detection and measurement of radioactivity – methods based upon ionization (GM counter), methods based upon Excitation(Scintillation counter).

Autoradiography and isotope dilution techniques.

Applications of radioisotopes in the elucidation of metabolic pathway, clinical scanning and radio dating.

Biological hazards of radiation and safety measures in handling radio isotopes.

BOOKS RECOMMENDED

1) Principles and techniques of practical Biochemistry

Keith Wilson & John Walker

Fourth Edition, (1995)

Cambridge University Press, London

2) Modern Experimental Biochemistry

Rodney Boyer

Third Edition, (2001)

Benjamin Cumnuns, New York