



# ANDHRA UNIVERSITY

## TRANS-DISCIPLINARY RESEARCH HUB

### PAPER-I: BIOCHEMICAL AND BIOPHYSICAL TECHNIQUES

#### UNIT I:

Colloidal solutions of biopolymers and their electrochemical properties. Hydrodynamic properties: Viscosity, diffusion etc of biopolymers; osmotic pressure, reverse osmosis, and Donnan effect.

Tissue homogenization. Disruption of tissues and cells. Centrifugation: Basic principles and application of – preparative and analytical ultracentrifuge, differential and density gradient centrifugation

#### UNIT II:

Principles, methods and applications of chromatography – Paper, thin layer, ion exchange, gel filtration and affinity chromatography, GLC, RPC, HPLC.

Electrophoresis: Different methods of electrophoresis for protein, nucleic acids, small molecular weight compounds and Immuno electrophoresis. SDS-PAGE, Isoelectric Focussing, Two Dimensional Gel Electrophoresis, Pulse-Field Gel Electrophoresis.

#### UNIT III:

Basic Principles of spectroscopy, basic laws of light absorption; instrumentation and applications of UV\_visible, IR,ESR,NMR, atomic absorption and Mass spectroscopy, fluorimetry, flame photometry, nephelometry, ORD, CD, X-ray diffraction.

Microscopy: Basic principles and application of - phase contrast, fluorescent and electron microscopes (SEM and TEM)

#### UNIT IV:

Nuclear techniques – nature of radioactivity, Detection and measurements of radioactivity- Liquid scintillating counting, Geiger-Muller counting; Radio isotopic techniques, Biochemical uses of isotopes. Radiation hazards and methods of radioactive disposal.

#### UNIT V:

Automatic analyzer for amino acids, protein sequencer, peptide synthesizer & nucleic acid synthesizer. Cell sorters and their applications. Theory of lyophilization and its applications to biological systems. Principles and applications of manometry and oxygen electrode.

#### Reference Books:

1. Principles and Techniques of Biochemistry and Molecular Biology- K. Wilson, John Walker, 6<sup>th</sup> ed
2. Biophysical chemistry – Upadhyay, Upadhyay, Nath (Himalaya publications)
3. Introduction to Biophysics by Pranab Kumar Banerjee, S Chand and company, 2008.
4. Instrumental methods of chemical analysis by G. R Chatwal and S .K Anand, Himalaya publishing house, 2008.

