

## BSS405 BIOCHEMICAL TECHNIQUES

### Course Outcomes:

*Upon successful completion of the course, students will be able to:*

- CO 1. Know the principle and applications of basic biochemical techniques.
- CO 2. Understand the role of biological solutions and calculations
- CO 3. Understand principle, instrumentation, applications and types of chromatography
- CO 4. Know the principle, instrumentation, applications and types of centrifugation
- CO 5. Understand the principle, instrumentation, applications and types of electrophoretic techniques

### Unit I (13 hours)

**Biological Solutions:** preparation of solutions-Normality, molarity and molality: Acids and Bases, Buffers, salting in, salting out, Osmosis, Dialysis, Donnan Membrane Equilibrium, Viscosity of macromolecules, relationship with conformational changes, Density. **Chromatography** Principles of partition chromatography, paper, thin layer, column chromatography, ion exchange and affinity chromatography, gas chromatography, gel permeation chromatography, HPLC and FPLC.

### Unit II (13 hours)

**Centrifugation** Principles of centrifugation, Svedberg's constant, concepts of RCF, different types of instruments and rotors, preparative, differential and density gradient centrifugation, analytical ultra-centrifugation, determination of molecular weights and other applications, subcellular fractionation. Filtration methods: Invention of filtration method. Various types of filter membranes and their applications.

### Unit III (13hours)

**Electrophoretic techniques** Principles of electrophoretic separation. Continuous, zonal and capillary electrophoresis, different types of electrophoresis including paper, cellulose, acetate/nitrate and gel. Electroporation, pulse field gel electrophoresis, PAGE, SDS- PAGE and Iso electro focusing.

### References:

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4. Cantor, C.R., Schimmel, P.R. (1980)Biophysical Chemistry Part II. Techniques for the study of biological structureandfunction, W.H.Freeman
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6. Jackson M. B. (2006).Molecular& Cellular Biophysics, Cambridge Universitypress.
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8. Freifelder D. (1982) Physical Biochemistry, 2<sup>nd</sup>Ed.
9. Segal I. H. (1976) Biochemical calculation, 2<sup>nd</sup>Ed.
10. Wilson, K. and Walker, J.(1996). Practical biochemistry.PrinciplesandTechniques. Cambridge Low PriceEditions
12. Shrikant, L. P. (2013) Understanding Biophysics. 4<sup>th</sup>Ed., Suman Publications.
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15. Gault, V. A., & McClenaghan, N. H. (2013).Understanding bioanalytical chemistry: principles and

- applications. John Wiley & Sons.
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  17. Manz, A., Pamme, N., &Iossifidis, D. (2004).Bioanalytical chemistry. World Scientific Publishing Company.
  18. Ramesh, V. (Ed.). (2019).Biomolecular and Bioanalytical Techniques: Theory, Methodology and Applications. John Wiley & Sons.
  19. Hoppe, W., Lohmann, W., Markl, H., & Ziegler, H. (Eds.). (2012).Biophysics. Springer Science & Business Media.
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