

Expected outcomes of the course BCH- II

1. The student will learn the various analytical techniques and their applications in separation and isolation of cells and tissues for studying their functional abnormalities
2. The knowledge in the analytical techniques will enable the student for isolation ,purification and chemical characterization of compounds from plants and microbes which will have medical or commercial importance.
3. The practicals will provide the expertise to the student for quantification of electrolytes and other metal ions, hormones and identification of bacteria.
4. The expertise gained by the student in this course can be useful in food industries ,pharma industries, clinical and microbiological labs.

Major Domain Subject: BIO-CHEMISTRY

SEMESTER-II

Course: Analytical techniques

Code: BCH-II

60 HRS

(5 periods/week)

Unit-I: Cell homogenization and centrifugation **12**

hours

Methods of tissue homogenization: (Potter-Elvehjem, mechanical blender, sonicator and enzymatic). Centrifugation techniques, principles and applications- differential, density gradient. Ultra-centrifugation- preparative and analytical.

Unit-II: Chromatographic techniques **12**

hours

Types of chromatographic techniques, Principle and applications - Paper chromatography- solvents, R_f value, applications; Thin layer chromatography- principle, choice of adsorbent and solvent, R_f value, applications; Gel filtration, Ion- exchange- principle, resins, action of resins, experimental techniques, applications, separation of metal ions; Affinity chromatography.

Unit-III: Spectroscopy and tracer techniques **12**

hours

Electromagnetic radiation, Beer-Lambert's law.

Colorimetry and Spectrophotometry, spectrofluorimetry, flame photometry. Tracer techniques: Radio isotopes, units of radio activity, half life, β and γ - emitters, use of radioactive isotopes in biology, ELISA, RIA.

Unit-IV: Electrophoresis **12 hours**

Electrophoresis- principles and applications of paper, polyacrylamide (native and SDS) and agarose gel electrophoresis, isoelectric focusing, immune-electrophoresis-types and applications.

Unit-V: Microbial techniques:

12

hours

Microscopy: Basic principles of light microscopy, phase contrast, electron microscope and fluorescent microscope and their applications.

Preparation of different growth media, isolation and culturing and preservation of microbes, Gram's staining- Gram positive and Gram negative bacteria, motility and sporulation, Sterilization techniques-Physical methods, chemical methods, radiation methods, ultrasonic and. Antibiotic resistance.

Practical BCP- 201 :

Biochemical Techniques

List of Experiments:

1. Isolation of RNA and DNA from tissue/culture.
2. Qualitative Identification of DNA, RNA and Nitrogen Bases
3. Isolation of egg albumin from egg white.
4. Isolation of cholesterol from egg yolk.
5. Isolation of starch from potatoes.
6. Isolation of casein from milk.
7. Separation of amino acids by paper chromatography.
8. Determination of exchange capacity of resin by titrimetry.
9. Separation of serum proteins by paper electrophoresis.

Recommended books:

1. Principles and Techniques of practical Biochemistry. Eds. Williams and Wilson.
2. Techniques in Molecular biology Ed. Walker & Gastra, Croom Helm, 1983.
3. Principles of instrumental analysis, 2nd Ed, Holt-Sanders, 1980.
4. An introduction to spectroscopy for Biochemistry. Ed. Brown S.N., Academic press
5. Analytical Biochemistry, Holmes and Hazel peck, Longman, 1983.

6. An introduction to practical biochemistry. David T. Plummer, Tata Mac Grew-Hill.
7. Biophysical chemistry, Edshall & Wyman, Academic press Vol. II & I.
8. A textbook of quantitative inorganic analysis including elementary instrumental analysis, Vogel ELBS.
9. Biochemical calculations Seigel, IH, 2nd Edit, John Wiley & sons Inc., 1983.
10. Analytical Biochemistry by Friefelder David