Dr. B.R. AMBEDKAR UNIVERSITY, SRIKAKULAM
(CBCS Proposed Syllabus)
Subject: Analytical Chemistry
w.e.f. 2020-21
II B.Sc ANALYTICAL CHEMISTRY
SEMESTER – III
Course III - ANALYTICAL CHEMISTRY-3 60hrs (4h/w)

SEPARATION METHODS - I Objective: To acquire basic knowledge of the analytical chemistry of important techniques that will provide the basis for their industrial production methods. To provide an adequate mastery of analytical methods used for the determination of commercial/domestic raw materials and finished product quality.

Course Learning Outcomes:
By the end of this course,
students will be able to: Become familiar with fundamental concepts of partition coefficients and their role in achieving separations across different types of chromatography.
Develop the core skills to parse existing chromatographic protocols and identify the key factors influencing a chromatography experiment.
Understand the underlying assumptions of the most common chromatographic separation techniques and approaches to method validation.
Understand the concept of solubility and their application in separation using distribution law. Learn application of dialysis and membrane for various techniques.

SEPARATION METHODS - I

UNIT – I **12hrs**
Solvent Extraction: Introduction, principle, techniques, factors affecting solvent extraction, Batch extraction, Continuous extraction and counter current extraction. Synergism, Application Determination of Iron (III)
Ion Exchange: Introduction, action of ion exchange resins, separation of inorganic mixtures, applications, Solvent extraction: Principle and process,

UNIT– II **12hrs**
Chromatography:
A. Classification of chromatographic methods: Principle of differential migration, description of the chromatographic process, distribution coefficients, modes of chromatography, performing column chromatography.
B. Chromatography– theory and practice: Introduction, the chromatograph (elution time and volume), capacity factor, column efficiency and resolution, sample preparation

UNIT – III **12hrs**

A. Techniques of paper chromatography: experimental modifications, various modes of development, nature of the paper, detection of spots, retardation factors, factors that affect the reproducibility of Rf values (due to paper, solvent system, sample, development procedure), selection of solvent, quantitative analysis. Applications

B. Thin layer chromatography: stationary phase, adsorbents, liquid phase supports, plate preparation, mobile phase, sample application, development, saturation of chamber, detection of spot, Rf values (effect of adsorbent, solvent, solute, development process), quantitative analysis, applications

UNIT – IV **12hrs**

Column Chromatography.

A. General: columns, matrix materials,stationaryphase, column packing, application of sample, column development and sample elution, detectors and fraction collectors, applications.

B. High performance liquid chromatography: Principle, column, matrices and stationary phases, column packing, mobile phase and pumps, application of sample, detectors, applications.

C. Adsorption chromatography: Principle, adsorbents, solvents, nature of solute, operating parameters, retention volumes and times, applications.

UNIT – V **12hrs**

A. Liquid-liquid partition, chromatography: Principle, normal phase chromatography, reversed- phase liquid chromatography, reversed phase liquid chromatography, applications.

B. Ion- exchange chromatography: Principle, ion exchangers, ion- exchange equilibria, ionexchange resin selectivity, column operations (column development, detection of solute bands), factors affecting retention volumes, applications.

LABORATORY COURSE -III 30 hrs (2 h / w)

Practical-III PRACTICAL ANALYTICAL CHEMISTRY (At the end of Semester-III)

1. Determination of Rf value of amino acids using paper chromatography.
2. Separation and identification of monosaccharide present in a given mixture by paper chromatography.
3. Determination of equivalent conductance of a weak electrolyte (acetic acid) at different concentrations.
4. Determination of adulterant in some common food items: i) Chicory in coffee powder, ii) Foreign resin in asafetida iii) Chilli powder iv) Turmeric powder v) Pulses

Suggested Readings:

1. F.W. Fifield and D. Kealy : Analytical Chemistry.
2. Daniel C Harris: Exploring chemical analysis.
3. Daniel C Harris: Quantitative chemical analysis.
4. R.V. Dilts Analytical Chemistry- Methods of Separation.
5. O. Mikes, R.A. Chalmers: Laboratory Handbook of Chromatographic Methods.

Teaching Learning Process:

Teaching Learning Process for the course is visualized as largely student-focused.
Transaction through an intelligent mix of conventional and modern methods.
Engaging students in cooperative learning. Learning through quiz design. Problem solving to enhance comprehension.

Assessment Methods:

Assessment will be done on the basis of regular class test,
presentations and assignments as a part of internal assessment during the course as per the curriculum.
End semester university examination will be held for both theory and practical. In practical, assessment will be done based on continuous evaluation, performance in the experiment on the date of examination and viva voce.