

DEPARTMENT OF CHEMISTRY
SYLLABUS FOCUS ON EMPLOYABILITY

DSC-3: Analytical and Organic Chemistry-II
Contact Hours: 56 Work load: 4 Hours/Week.

Unit-I

Quantitative Analysis-Instrumental methods

Electromagnetic spectrum, absorption of electromagnetic radiation, Definition and units of frequency, wavelength, wave number, Beer's law, Beer-Lambert law derivation, deviations from Beer's law, limitations, construction of calibration graph (Plot of absorbance versus concentration), Evaluation Procedures- standard addition, Internal standard addition, validation parameters-detection limits, sensitivity, dynamic/linearity range, Instrumentation, single beam and double beam spectrophotometers, quantitative applications of colorimetry (determination of Fe, Mo, Cu, Ti and PO₄³⁻) and numerical problems on application of Beer's law. **10 hrs**

Nephelometry and Turbidimetry: Introduction, principle, instrumentations of nephelometry and turbidimetry; effects of concentration, particle size and wavelength on scattering; choice between nephelometry, applications of nephelometry and turbidimetry (determination of SO₄²⁻ and PO₄³⁻). **4 hrs**

Unit-II

Separation methods

Solvent Extraction: Definition of solvent extraction, Types- batch, continuous, efficiency, selectivity, Nernst distribution law, derivation, distribution coefficient, factors affecting the partition, relationship between % extraction and volume fraction, Numerical problems on solvent extraction. Solvent extraction of iron and copper. **4hrs**

Fundamentals of chromatography: General description, definition, terms and parameters used in chromatography, classification of chromatographic methods, criteria for selection of stationary and mobile phase and nature of adsorbents. Principles of paper, thin layer, column chromatography. Column efficiency, factors affecting the column efficiency, van Deemter's equation and its modern version. **3hrs**

Paper chromatography: Theory and applications.

Thin layer chromatography (TLC): Mechanism, R_f value, efficiency of TLC plates, methodology–selection of stationary and mobile phases, development, spray reagents, identification and detection, qualitative applications. **4 hrs**

Ion exchange chromatography: resins, types with examples- cation exchange and anion exchange resins, mechanism of cation and anion exchange process and applications of ion-exchange chromatography (softening of hard water, separation of lanthanides, industrial applications). **3hrs**