

Syllabus for Paper III (core)

Post code : EVT1

Taken from curriculum of first degree program –Chemistry & Environmental Science (Taken from Kerala university -2015 syllabus on Environmental Science & Biochemistry)

Analytical Principles

General principles of chemical analysis, quality control and quality assurance protocols, Errors: Types and sources, Accuracy, Precision, minimisation of errors, Significant figures.

Statistical evaluation of Data Standard deviation, variance and coefficient of variation. Tests of significance. Confidence limits, Measurement Uncertainty

Volumetric methods: Classification of reactions in volumetry. Theory of indicators. Complexometric titrations: Titration using EDTA-direct and back titration methods, Precipitation titrations, Redox titrations, Potentiometric titrations, Ion- Selective electrodes, Classical electrochemical analysis such as polarography, voltammetric techniques such as anodic stripping voltammetry, pulsed voltammetry, Amperometry etc

Separation Techniques and Instrumental methods of chemical analysis

Chromatography: Principle, Technique and Applications of Partition, Paper, Column, HPLC, TLC, GC and Ion exchange chromatography.

Principle, Theory and Instrumentation of TG, DTA, DSC Basic theory and instrumentation of Flame spectrometry, AAS and ICP-AES, ICP-MS, GC-MS/MS, LC-MS/MS, HRGC-HRMS, Total Organic Analyzer, Ion Chromatography (IC), IC-ICPMS, Flow Analyzers

Basic spectroscopy

Electromagnetic radiation and electromagnetic spectra, Interaction of Electromagnetic radiation with matter, Atomic spectra, molecular spectra and selection rules, Doppler broadening and Collision broadening, Absorption and Emission spectra, Fundamentals of UV-Vis, IR and NMR spectral techniques, Basic idea of instrumentation.

Environmental Chemistry

The atmosphere of Earth; Contaminant behaviour in the environment; Air pollutants, Detection of pollutants, Greenhouse effect, Acid rain and Ozone layer depletion, Organic Pollutants; Pollution from Combustion Systems; Smog and Types of smog; Water Pollution, Major Sources of Water Pollution, BOD and COD.

Environmental Analysis (Sampling, Sample preparation and analysis of water, wastewater and air)

Air sampling, Stack and Ambient air sampling, Classical environmental analysis such as analysis of water, wastewater, soil, air etc for parameters such as pH, TDS, TSS, VSS, Conductivity, Turbidity, Chloride, Sodium, Potassium, Calcium, Magnesium, Hardness, Nitrate/Nitrite, Kjeldahl nitrogen, ortho/total phosphate, phenol, Dissolved oxygen, COD, BOD, Particulate matter, SO₂, NO_x, and instrumental analysis for contaminants such as heavy metals, pesticides, dioxins, furans, PCBs and PAHs

