

5th Semester	REI5D006	Analytical Instrumentation	L-T-P 3-0-0	3 CREDITS
------------------------------------	-----------------	---------------------------------------	------------------------	----------------------

Analytical Instrumentation

Module I:

(13 Hours)

Fundamentals of Analytical Instruments: Elements of an Analytical Instrument, Intelligent Analytical Instrumentation Systems, PC-based Analytical Instruments. Spectrophotometers: Ultraviolet and Visible Absorption Spectroscopy, Calorimeters, Photometers, Different types of Spectrophotometers, Sources of Errors and Calibration, Infrared Spectrophotometers – Basic Components and Types, Sample Handling Techniques, Flame Photometers – Principle, Constructional Details, Types and accessories, Atomic Absorption Spectrophotometers and their instrumentation.

Module II:

(13 Hours)

Chromatography: Gas Chromatograph – Basic Parts of a Gas Chromatograph, Methods of Measurement of Peak Areas, Liquid Chromatograph – Types, High Pressure Liquid Chromatograph. pH meters and Ion Analyzers: Principle of pH Measurement, Electrodes for pH Measurement, pH Meters, Ion Analyzers, Blood pH Measurement.

Gas Analyzers: Measurement of Blood pCO₂ and pO₂, Industrial Gas Analyzers – Types, Paramagnetic Gas Analyzer, Infrared Gas Analyzers, Industrial gas Analyzers Based on Other Methods.

Module III:

(10 Hours)

Principles of Nuclear Magnetic Resonance: Nuclear Magnetic Resonance (NMR) Spectroscopy – Principle, Types and Construction details of NMR Spectrometers. Radiochemical Instruments: Fundamentals of Radiochemical Methods, Radiation Detectors, Liquid Scintillation Counters, Gamma Spectroscopy. Ray Spectrometers: Instrumentation for X-Ray Spectrometry, X-Ray Diffractometers, X-Ray Absorption Meters, Electron Probe Microanalyzer.

Books:

- [1] Handbook of Analytical Instruments – by R.S. Khandpur, TMH Education Pvt.Ltd.
- [2] Instrumental Methods of Analysis – by Willard H.H., Merrit L.L., Dean J.A. and Seattle F.L., CBS Publishing and Distributors, 6/e, 1999
- [3] Instrumentation, Measurement and Analysis - B.C. Nakra and K.K. Chowdhury, TMH.
- [4] Instrument Technology – by Jones B.E., Butterworth Scientific Publ., London, 1987. Mechanical and Industrial Measurements by Jain R.K., Khanna Publishing, N Delhi, 2/e, 1992.
- [5] Principles of Instrumental Analysis – by Skoog D.A. and West D.M., Holt Sounder Publication, Philadelphia, 1985.
- [6] Measurement and Instrumentation: Trends and Applications - M.K. Ghosh, S. Sen and S. Mukhopadhyay (ed.), Ane Books, New Delhi, 2008.