

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
DIR2E2: Analytical Instrumentation	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Course Objective: This course exposes the students to various instruments and techniques used in the analysis and identification of elements and compounds

Prerequisite: Knowledge of basic Electronics and Fundamentals of Chemistry

COURSE CONTENTS

Unit I

Colorimeters, Visible-Ultraviolet Spectrometers (single beam, Direct reading), **Infrared Spectrometers:** Basic components, Types of IR spectroscopy, **Atomic Absorption Spectrometers:** Flame photometer (principal and constructional details), principle of AAS, radiation sources, Burners and Flames, Plasma Excitation sources.

Unit II

Fluorimeters: Principle of Fluorescence, Measurement of fluorescence, Phosphorimeters, **Raman Spectrometer:** The Raman effect, Source, sample chamber, spectrometer and detector, Photo Acoustic, Photo thermal Spectrometers **Mass Spectrometers:** Principle of operation, Types of MS, Components of MS, ICP-MS

Unit III

Nuclear Magnetic Resonance Spectrometers: Principle of NMR, Types of NMR, Constructional details of NMR, **Electron Spin Resonance Spectrometers:** Basis ESR spectrometer and constructional details, Electron and Ion Spectroscopy, Basic X-ray Spectrometers

Unit IV

Gas Chromatographs, Liquid Chromatography, Thermo Analytical Methods

Unit V

PH Meters, Blood Gas Analyzer, Industrial Gas Analyzers, Environmental Pollution Monitoring Instruments

Text and Reference Books:

- [1] H. H. Williard, L. L. Merrit, J. A. Dean, and F. A. Settle, Instrumental Methods of Analysis, 7/e, CBS Publishers and Distributors, India, 1988
- [2] D. A. Skoog, F. J. Holler, and T. A. Nieman, Principles of Instrumental Analysis, 6/e., Thomson Learning, 1998
- [3] R. S. Khandpur, Handbook of Analytical Instruments, Tata McGraw Hill, New Delhi
- [4] R. K. Jain, Mechanical and Industrial Measurements, Khanna Publishers, Delhi, 1985
- [5] G. W. Ewing, Instrumental Methods of Chemical Analysis, 5/e., McGraw Hill, Singapore, 1992.
- [6] R. E. Sherman and L. J. Rhodes (Eds), Analytical Instrumentation, ISA Press, New York, 1996.
- [7] B. G. Liptak, Process Measurement and Analysis, 3rd ed., Chilton Book Company, Pennsylvania, 1995
- [8] Behrouz A. Forouzan, Data Communications and Networking, 4/E Tata McGraw-Hill, 2000.