

Course code: Course Title	Course Structure			Pre-Requisite
EP103: Engineering Physics Workshop-I	L	T	P	NIL
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Course Objective: The main objective of the course is to give hands-on experience of research through latest S&T equipment and facilities.

S. No	Course Outcomes (CO)
CO1	Explain the effect of excitation voltage and anode material for X-ray generation.
CO2	Experiment of structural characterization for determination of lattice parameters.
CO3	Evaluate the optical properties of materials.
CO4	Define the principle of image formation.
CO5	Describe the surface of the materials.

S. No	Contents
UNIT 1	X-RAY PRODUCTION: Electromagnetic radiation, continuous spectrum, characteristic spectrum, X-ray absorption (adsorption edge, excitation voltage, Auger effect etc.), X-ray filters.
UNIT 2	X-RAY DIFFRACTOMETER: Basics of crystallography and hands on experience of XRD instrument, Determination of lattice parameters, crystallite size and strain in nanomaterials.
UNIT 3	UV-VISIBLE SPECTROSCOPY: Basic principle of UV visible spectroscopy, Knowledge to record UV visible spectra of liquid, solid, and powder samples.
UNIT 4	INTRODUCTION TO MICROSCOPY: Basic principles of image formation, General concepts of microscopy: resolution. Magnification, depth of field, depth of focus etc.
UNIT 5	SCANNING ELECTRON MICROSCOPY: Working principle in scanning mode, Signal generation: Inelastic scattering (Secondary vs. backscattered electron, Auger electrons, characteristic X-ray emission etc.).

REFERENCES		
S.No.	Name of Books/Authors/Publishers	Year of Publication / Reprint
1	Elements of X-ray diffraction; B. D. Cullity, Pearson Education.	2014
2	Scanning Electron Microscopy and X-Ray Microanalysis; I. J. Goldstein, D. E. Newbury, J. R. Michael, N. W. Ritchie, J. H. J. Scott, D. C. Joy, Springer, 4th edition.	2017
3	Light and Video Microscopy; R. O. Wayne, Elsevier.	2009
4	Fundamentals of molecular spectroscopy; C. N. Banwell, E. M. McCash, Mc-Graw Hill, Indian Edition.	1994

