

Subject Code:1SC2050204

Subject Title: Elements of Experimental Physics

COURSE OBJECTIVE:

Physics is a science to understand the nature. This course is designed to get basic understanding of the physical world.

LEARNING OUTCOMES:

Students can get basic ideas of instruments used in research laboratory.

Teaching scheme (hours) per week		Credit		University Examination		Internal Examination		Total
Theory	Practical	Theory	Practical	Theory	Practical	Theory	Practical	
4	--	4	--	60	--	40	--	100

Unit	Content	Lectures	Weight (%)
1	Classification of vacuum pumps, Rotary pump, Diffusion pump, Molecular drag pump, Gettering and ion pumping, Sputter ion pump, measurement of pumping speed: constant pressure method, constant volume method. Classification of gauges, McLeod gauge, Thermal conductivity gauge, Thermocouple gauge, Hot cathode ionization gauge, Bayard-Alpert gauge, Cold cathode ionization gauge, Penninggauge, Magnetron gauge.	15	25
2	Thermal Analysis: Thermo gravimetric analysis, Differential thermal analysis and Differential scanning calorimetry, X-ray photoelectron spectroscopy, X-ray fluorescence spectroscopy, UVVisible spectroscopy, atomic absorption spectroscopy.	15	25
3	X-ray Diffraction: X-ray sources, Production of X-rays, continuous X-rays, characteristics X-rays, X-ray filters, X-ray absorbers, Scattering by electrons, atom and unit cell, Electron Diffraction: Introduction to electron diffraction, Transmission Electron microscopes, Neutron Scattering: Slow neutron scattering in solid, Elastic Scattering, Cross – section, Coherent Scattering.	15	25
4	Ionization Chamber, Proportional Counter, Geiger-Mueller Counter, Scintillation detector: organic scintillator, Inorganic scintillator, Light guides, Photomultiplier tubes, Scintillation Spectrometer, Energy resolution of a scintillation spectrometer, Semiconductor detectors: Diode detector, Diffused junction detector, Surface barrier detector, Ion implanted layer detectors, Fully depleted detectors, Lithium doped germanium detector [Ge(Li)], High purity germanium detector (HPGe), Cherenkov Detector, Photographic emulsion, Cloud Chamber, Bubble Chamber, Spark Chamber.	15	25

Basic Reference book:

1. Vacuum Science and Technology V.V. Rao, T.B. Ghosh and K.L. Chopra Allied Publishers Limited (India)
2. Elements of X-ray diffraction Cullity and Stock
3. An introduction to lattice dynamic L.S Kothari
4. Biomedical instrumentation & measurements L. Cromwell
5. Instrumental method of analysis Willard
6. Fundamentals of Nuclear Physics. Jagdish Varma, Roop Chand Bhandary, D.R.S. Somayajulu.