

SYLLABUS :-

Design of Transmission Electron Microscope: Electron Sources, Lenses, Aperture and Resolution, Aberrations, Electron Optics in bright and dark field. Imaging in conventional TEM: Theory of amplitude contrast images, extinction contours, imaging of line and surface defects, strain fields and use of weak beam dark field imaging. Electron Diffraction: Concept of reciprocal space; indexing diffraction patterns and Kikuchi patterns, Micro-diffraction; Convergent Beam Electron Diffraction. Imaging and Diffraction in Scanning Transmission Electron Microscopy. High Resolution Transmission Electron Microscopy: Phase Contrast Imaging, Contrast Transfer Function, Scherzer Defocus, Envelop damping functions, Image simulation methods. Analysis: Energy Dispersive X-Ray Analyses Principle and operation, Resolution and Detector, Qualitative and Quantitative Analyses, Corrections, ALCHEMI. Electron Energy Loss Spectroscopy Principle and operation of PEELS, Concept of Zero Loss, Low and High Loss Spectrum, Interpretation of EELS data.