ME 643 Material Characterization Methods (3-0-0-6)

X-Ray Techniques: Elements of Crystallography, Principles of X-ray diffraction, X-ray equipment and data analysis; associated techniques in X-ray spectroscopy; Fundamentals of elementa analysis. Optical/Electron Microscopy Techniques: Specimen preparation techniques for optical and electron microscopy in metallurgy. Elements of phase identification, grain size determination, inclusion analysis, Image analysis, etc.. Electron diffraction, SEM, Failure analysis and fractography, EDAX / EPMA, data analysis. Neutron Scattering Techniques: Diffraction, inelastic scattering and reflectometry. Thermal Analysis: Principles and applications of thermal analysis; DTA, DSC, TGA, TMA, DMA, etc. Mechanical Property characterisation: Principles and chartacterisation techniques related to Tensile, compressive, hardness, fatigue, and fracture toughness properties. Deformation; Superplasticity.

Textsbooks:

[1] *Materials characterisation*, Vol. 10, ASM hand book, 1997 ,

[2] B. D. Cullitey, *Elements of X-ray diffraction*, Addison-Wesely, 1968.

[3] G. Dieter, *Mechanical Metallurgy*, Mc-Graw Hill, 1996.

[4] *ASTM handbook*, vol. 3, 1997.

[5] R.F. Speyer, *Thermal Analysis of Materials*, Marcel Decker, 1994.