MLPE3003 ANALYTICAL PROCESSES IN MINERAL PROCESSING (3-0-0)

Course Objectives:

- To enhance the fundamental knowledge and applications of various analytical processes used in Mineral industry.

Module-I: (06 Hrs)

Role of characterization in mineral processing, conventional methods of analysis, application of modern instruments of analysis of minerals, Indian standards for analysis.

Sampling of minerals for analysis. Determination of physical parameters of a material such pH, conductivity, density, size, electrical properties etc.

Module-II: (06 Hrs)

Microscopy: Types and principles. Ore Microscopy: Identification of ores and minerals. Classification of minerals. Grain analysis, Mineral liberation analysis. Electron microscopy: SEM, TEM. EPMA and Image analysis

Module-III: (06 Hrs)

Fundamental of titrimetric and gravimetric analysis. Determination of iron, aluminum, copper, lead, zinc, manganese, chromium, calcium, magnesium etc. from ores.

Module-IV: (06 Hrs)

Spectro analytical method: X-ray, atomic absorption, flame photometry, UV and IR spectrophotometry and colorimetry. Zeta potential measurement.

Module-IV: (06 Hrs)

X ray diffraction analysis of minerals, Thermal analysis of materials: principle and types, TGA, DTA and DSC

Course Outcomes:

After successfully studying this course, students will able to:

CO1: To understand the role of characterization in mineral processing industry
CO2: To explore the principle of microscopic analysis
CO3: Demonstrate proficiency and perceptiveness of the basic concepts of titrimetric and gravimetric analysis
CO4: To explore the principle and analysis using spectroscopic methods
CO5: To acquire knowledge of thermal analysis and XRD analysis

Text Books

1. Mendham J., Denney R. C., Barnes J. D., Thomas M., Sivashankar B., Vogel's Quantitative Chemical Analysis, 6th Edition, Pearson Education, 2009
2. Petruk W., Applied Mineralogy in the Mining Industry, Elsevier Science Ltd, 2000
3. Manual of Procedure for Chemical and Instrumental Analysis of Ores, Minerals, Ore Dressing Products and Environmental Samples, Indian Bureau of Mines, 2012

Reference Books:

1. Wayne J., Mineralogy and Mineral Analytical Techniques, Syrawood Publishing House, 2016
2. Khawas B.H., Analytical Methods for Ores and Minerals, TechSar Pvt. Ltd; First Edition, 2013
3. Kaufmann E.N., Characterization of Materials: 2 Volume Set, Wiley–Blackwell,2003