

## MIPE3001 MINERAL PROCESSING TECHNOLOGY (3-0-0)

### Course Objectives

To impart fundamental and applied knowledge of mineral processing techniques, including comminution, classification, concentration (gravity, flotation, magnetic, electrostatic), dewatering, and agglomeration. The course emphasizes flow sheet development for various ores and industrial minerals, equipping students with skills for efficient and sustainable mineral beneficiation.

### Module-I: (09 Hours)

Introduction to mineral beneficiation, sampling, liberation studies and its importance. Comminution: Fundamentals of comminution, crushing -- construction and operational features of jaw, gyratory, cone and roll crushers. Grinding: Theory of ball mill, rod mill, critical speed of the mill, open circuit, and closed circuit, circulating load.

### Module-II: (09 Hours)

Size separation: Sieving and screening, laboratory sizing and its importance, representation and interpretation of size analysis data, industrial screening. Classification: Movement of solids in fluids, free settling and hindered settling of particles, different types of classifiers, e.g. sizing and sorting classifiers used in mineral industry.

### Module-III: (11 Hours)

Concentration: Gravity separation, concentration criteria, jigging, flowing film concentration and tabling, dense media separation. Froth flotation: Theory, reagents used in floatation processes, machines and practice. Magnetic and electrostatic separation: Theory and application of magnetic and electrostatic separation techniques in mineral industry. Dewatering and drying: Theory and practice of thickening; filtration and drying.

### Module-IV: (09 Hours)

Flow sheets: Typical flow sheets for beneficiation of iron, gold, copper, lead-zinc sulphide ores, rock phosphate, beach sand, uranium, and other industrial minerals.

### Module-V: (07 Hours)

Agglomeration techniques: Sintering, palletizing, briquetting, and their applications in ferrous and non-ferrous metal industries, testing of agglomerates. Important mineral deposits in India.

### Books:

1. Principle of Mineral Dressing by A. M. Gaudin.
2. Element of Ore Dressing by A.E. Taggart.
3. Text Book of Ore Dressing by R. H. Richards and C. E. Locks.
4. Textbook of Ore Dressing by S.J. Trusscott.
5. Ore Dressing by S.K. Jain.
6. Mineral Processing Technology by Berry A Willis.

### Course Outcomes:

- CO1: Explain the principles of comminution (crushing/grinding), size separation, and classification, and their role in mineral liberation. (Understanding)
- CO2: Operate and compare different concentration methods (gravity, flotation, magnetic) for ore beneficiation. (Application/Analysis)
- CO3: Design basic flow sheets for processing iron, copper, gold, and industrial minerals. (Synthesis/Creation)
- CO4: Evaluate dewatering techniques (thickening, filtration) and agglomeration methods (pelletizing, sintering) for product handling. (Evaluation)
- CO5: Analyze case studies of Indian mineral deposits to correlate theory with industrial practices. (Analysis/Evaluation)