

PMT41102 MINERAL PROCESSING

Module I (14 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.

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 II (12 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 III (12 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.

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

Books for reference

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

(Practical)

Suggested list of experiments:

1. *Physical examination and identification of minerals.*
2. *Crushing of ore/ coal in a jaw crusher and to study the size analysis of the product.*
3. *To study the jaw crusher and determine the actual capacity and reduction ratio.*
4. *Verification of Rittinger's Law of crushing in a jaw crusher.*
5. *Crushing of ore/ coal in a roll crusher and to study the size analysis of the product.*
6. *Crushing of ore/ coal in a gyratory crusher / pulveriser and to study the size analysis of the product.*

7. *Crushing of ore/ coal in a cone crusher and to study the size analysis of the product.*
8. *To study the effect of grinding with grinding time in cylindrical ball mill and rod mill.*
9. *To separate coal from a mixture of coal and stones or quarts by zigging and determine the weight fractions of the products.*
10. *To separate a mixture of two minerals of different densities by gravity concentration using Wilfley Table and determine the weight and density of each fraction of the products.*
11. *Beneficiation of ore pulp mix using flotation cell.*
12. *To separate a mixture of iron and sand using magnetic separator and determine its efficiency.*
13. *Screening of ore/ coal using vibrating screen and determine its effectiveness.*