MLPC2002 SIZE REDUCTION AND CLASSIFICATION (3-0-0)

Course Objective:
To impact the fundamentals of size reduction devices and their application and to learn different screens and classifiers for their application in mineral processing.

Module I (6 Hrs)
Scope and necessity of mineral processing, flowsheet of metal production, degree of liberation, sampling of ore
Comminution: Principles and theories, Forces in comminution, Empirical evaluation of size reduction, Laws of comminution, particle disintegration. Kinetics of crushing and grinding.

Module-II (6 Hrs)
Crushing: Construction, operation and maintenance of crushers such as Jaw, Gyratory, Cone, Roll crusher, Hammer mills, optimization of crushing circuits, High compression rolls: their construction, operation maintenance and performance aspects. In-pit and portable crushers.

Module III (6 Hrs)
Grinding: Grinding mills principles, construction and their operation, Mill liners, Feed entry, and product discharge mechanisms. Open and closed-circuit grinding: Ball, Rod, Pebble, Autogenous and Fluid energy mills. Application of these mills for specific processing requirements: Effect of process parameters on mill performance. Closed & open circuit grinding optimization.

Module IV (6 Hrs)
Screening: mesh, test sieves: Tyler, ASTM and other series, sieve analysis. Industrial screening: Fundamentals of screening, dry and wet screening, Classification of screens and their construction, operation and maintenance of different types of industrial screens. Screen efficiency, Pre-scrubbing and other processes to improve screening efficiency.

Module V (6 Hrs)
Classification: Principle, introducing to different types of classifiers used in mineral industry; their construction and maintenance,
Hydrocyclones: Principle, construction, operation, maintenance. Efficiency of classifiers.

Text Books:

1. Gaudin, A.M., Principles of Mineral Dressing – McGraw Hill Book Company, 1971.
2. Wills B.A. and Napier-Munn T., Mineral Processing Technology

Reference Books:

1. Jain, S.K., Ore Processing, Oxford – IBH Publishing, 1984.
2. Taggart, A.F., Handbook of Mineral Dressing, John Wiley and Sons, New York, 1990.
3. Vijayendra,H.G., Handbook on Mineral Dressing, Vikas Publishing House Pvt. Ltd. 1995.

Course Outcome:
CO1: To understand the concept of size reduction for processing of mineral
CO2: To apply the basic principles of various crushing equipment
CO3: To demonstrate the basic principles of grinding operation
CO4: To analyze the concept of laboratory and industrial screening
CO5: To explore the working principles of various classifiers