

Course Type	Course Code	Name of Course	L	T	P	Credit
DC	MMC 301	MINERAL BENEFICIATION EQUIPMENT	3	0	0	9

Course Objective

To impart conceptual knowledge on constructional features, operational detail, selection, safety features, efficiency, capacity calculation, operational difficulties faced in industries of different type of mineral processing equipment.

Learning Outcomes

Students will understand basic design features of equipment, their selection, trouble shooting, performance analysis, environmental issues and safety features.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Size reduction process; Energy for size reduction; Work Index; Estimation of work index for size reduction equipment; Laboratory test for energy estimation in size reduction; Abrasion index.	4	It will help the students to get acquainted with different types of size reduction process used in Mineral industry
2	Milling Equipment: Construction, operation, selection, classification of ball mills, rod mills, Autogenous mill, semi-Autogenous mill, pebble mill, principle of milling process, grinding media, ore feeding and discharge arrangements, drives, accessories, capacity estimation, drives.	6	Students will understand constructional features, operating principle, mechanisms and capacity calculations of different types of Milling Equipment.
3	Jigs: Construction, operation, selection, classification of jigs, theory of jigging, jigging efficiency, design features, feeding and discharge principles, drives, accessories and controls, capacity estimation, associated terminologies, trouble shooting.	5	It will help the students to get acquainted with different types of Jigs used in Mineral industry.
4	Flotation Machines: Theory of flotation, construction, operation, maintenance, selection of different type of flotation machines, flotation cells, floating media, reagents, capacity calculation, terminologies, accessories, drive arrangements, trouble shooting.	5	This unit will help students to learn the different types of Floating machines used in mineral processing industries and their trouble shooting.
5	Classifiers: Constructional features, working principle and selection of different type of classifiers, classifier efficiency, maintenance and trouble shooting.	4	In this unit students will be able to understand the constructional features, working principle and maintenance of different types of classifiers.
6	Magnetic separators: Constructional features, working principle, selection of different type of magnetic separators, accessories, feeding and discharging arrangements, evaluation of efficiency, maintenance and trouble shooting.	4	Students will be able to understand basics of construction and operation of different types of Magnetic separators used in industry, their selection and maintenance.
7	Thickeners: Principle of thickening, classification, construction, design features, operation, drive arrangements, feeding and discharging methods, operational problems and maintenance.	4	In this unit students will be able to understand the constructional features, design aspects, working principle and maintenance of different types of Thickeners used in Mineral Industry.

8	Filters: Theory of filtration, operating principle, types, constructional features, filter cloth, accessories, maintenance, terminologies, selection, operational difficulties.	3	This unit will help students to learn the different types of Filters used in Mineral processing industries and their selection.
9	Cyclones and Centrifuges: Theory, construction, operating principle of pneumatic cyclone, hydro-cyclone, centrifuges, performance study, trouble shooting.	2	To understand the theory, construction, operating principle of different types of Cyclones and Centrifuges.
10	Types of screens; Screen surface and aperture; Operation of screens; Screen efficiency; Tromp curve; Capacity calculation; Screening circuit.	3	Get the knowledge of different types of screens, their operation and capacity calculation.
11	Slurry Pumps: General concept constructional features, selection, trouble shooting and pump layout.	2	Student will understand the constructional features and working principle of Slurry Pumps.

Text Books

1. Wills, B. A., & Finch, J. (2015). Wills' mineral processing technology: an introduction to the practical aspects of ore treatment and mineral recovery. Butterworth-Heinemann.

Reference Books

1. Colijn, H. (1985). Mechanical conveyors for bulk solids (Vol. 4). Elsevier Science Ltd.
2. Alexandrov, M. P. (1981). Materials Handling Equipment: MP Alexandrov. Mir Publishers.
3. Hetzel, F. V. (1922). Belt conveyors and belt elevators. J. Wiley and Sons.
4. Stoess, H. A. (1983). Pneumatic conveying. Wiley-Interscience.
5. Handbook, C. E. M. A. (1997). Belt Conveyors for Bulk Materials. Conveyor Equipment Manufacturer's Assoc., USA.
6. Mular, A. L., Halbe, D. N., & Barratt, D. J. (Eds.). (2002). Mineral processing plant design, practice, and control: proceedings (Vol. 1). SME.