

COAL AND MINERAL PROCESS EQUIPMENT SELECTION

Course Type	Course Code	Name of Course	L	T	P	Credit
DC	FMC301	Coal and mineral process equipment selection	3	0	0	9

Course Objective

The objective of the course is make students capable of selecting right equipment through worked out examples.

Learning Outcomes

Upon successful completion of this course, students will:

- be made familiar with various fundamentals and guidelines for equipment selection
- be able to do the selection and sizing of coal and mineral processing equipment for size reduction, separation and quality upgradation
- be made familiar with costing and performance evaluation of the process equipment

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Introduction: various methodologies involved in selection and sizing of various coal preparation and mineral processing equipment	2	Students will learn about various methodologies for selection and sizing of processing units
2	Equipment capacities: Definitions of equipment capacities: Broad guidelines for equipment specifications required in tendering processes in coal preparation and mineral processing, Equipment symbols: Standard Process equipment symbols as per BIS norms.	3	Fundamentals of equipment, capacities and flowsheets along with costing and purchase
3	Crushers: Selection and sizing of reciprocating and non-reciprocating crushers, such as roll crushers and impact group of crushers for coal application and reciprocating crushers, such as jaw, gyratory and cone crushers for ore application. Selection of rotary breaker for application in coal preparation	6	Selection and sizing of various size reduction units including primary, secondary and tertiary crushers through data-based problem solving
4	Selection and sizing of rod, SAG and ball mills including re-grinding mills for metallic and non-metallic ores	6	Selection and sizing of various dry and wet grinding units through data-based problem solving
5	Selection and sizing of industrial screens used in coal preparation and mineral processing Selection and sizing of hydrocyclones including limitations involved; General overview of selection criteria for mechanical classifiers	5	Selection and sizing of various size separation units including industrial screens, mechanical and hydrocyclones through data-based problem solving
6	Application of probable error in separation, imperfection, organic efficiency NGM, cut-density, capacity, feed size, OPEX, CAPEX, yield reduction factor etc. (as applicable) in selection of density separators.	3	Estimation and application of various technical and economic parameters in selection of density separators
7	Capacity estimation and selection of density separators used in metallurgical and thermal coal preparation including specific numerical examples as class work and as home work; Choice between Jigs, Dense Media Baths, Drums and Cyclones; Application of spirals and WOC.	8	Selection and capacity estimation of density separators for coal. Learning the rationale to make right choice of density separator.
8	Selection of different types of froth floatation cells (mechanical, Jameson, column, pneumatic, etc.) Estimation of number of banks and cells per bank for flotation of coal and minerals, such as limestone, fluorspar, copper and lead – zinc ores, etc with specific numerical examples as class work and as home work	5	Learn about selection of flotation cell and estimation of banks and cells per bank for various ores and minerals with the help of problems
9	General overview of selection criteria for magnetic and electrostatic separators	2	Learn about selection of magnetic and electrical separators
10	Performance Guarantee Tests for equipment used in coal preparation and mineral processing plants.	2	Learn about PGTs significance and its application in processing plants
	Total	42	

Text Books:

S. No.	Resource/Book Name	Author(s)/Editor(s)	Publisher
1	Mineral Processing Plant Design	Andrew L. Mular, Roshan Boman Bhappu	Society of Mining Engineers (AIME)
2	Mineral Processing Design and Operation: An Introduction	A. Gupta and D.S. Yan	Elsevier

Reference Books:

S. No.	Resource/Book Name	Author(s)/Editor(s)	Publisher
1	Process Selection in Extractive Metallurgy	Peter C. Hayes	Hayes Publishing
2	Mineral Processing Plant Design, Practice, and Control: Proceedings. Volumes I & II.	Andrew L. Mular, Doug N. Halbe, Derek John Barratt	Society for Mining, Metallurgy and Exploration