COURSE TYPE	COURSE CODE	NAME OF THE COURSE	L	T	P	CREDIT
DC	NFMC501	Size Preparation Technology	3	1	0	4

COURSE OBJECTIVE
• To impart the knowledge of the industrial techniques of size preparation and prepare the students for operating commercial size reduction and size separation equipment and circuits
LEARNING OUTCOMES
At the end of this course, the students will learn about the ● Theories of size reduction and size separation ● Construction and operation of crushers, grinding mills, screens and classifiers used in the industry ● Scope, merits and demerits of different size preparation equipment and their integration into the plant circuit

NO.	TOPICS TO BE COVERED	LECTURE HOURS	TUTORIAL HOURS	LEARNING OUTCOME
1	**Introduction:** Definition, necessity, scope and importance of coal preparation and mineral processing. Importance of comminution and classification. Need and benefits of size preparation. Degree of liberation. Sampling of coal and minerals: theory and procedures (laboratory and industrial)	3	0	Introduction to the course and understanding of the need and application of size preparation technologies
2	**Particle characteristics:** Definition and measurement of particle size, size distribution, shape, surface area, and density. Size distribution models.	4	3	Knowledge of the properties of solids relevant to size preparation
3	**Comminution fundamentals:** Definition, scope and importance of comminution. Theories of single particle and particle bed breakage. Comminution laws. Hardness. Grindability indices: HGI, BWI, etc. Reduction ratio.	5	3	Knowledge of the basics of size reduction phenomena and hardness
4	**Crushers:** Construction, types (if any), operation, application, merits, limitations, and capacity calculation of comminution equipment: jaw crusher, gyratory crusher, rotary	7	3	Knowledge of the salient features of industrial crushing equipment

	breaker, single and double roll crusher, sizer, cone crusher, impact crusher, hammer mill, ring granulator, etc. Performance analysis of crushers.			
5	**Screening:** Fundamentals of industrial screening. Classification of screens. Construction, operation and application of different types of industrial screens. Factors affecting screening performance. Screen performance analysis.	6	1	Knowledge of the different screening equipment used in the industry
6	**Grinding:** Tumbling mills: operating principles, types, construction, application, design features and operating parameters. Coal grinding equipment (bowl mills, roller mills, etc.), their construction, operation, merits and limitations.	7	2	Familiarization with the industrial grinding equipment used for coal and ores
7	**Classification:** Fundamentals of classification, the motion of particles in fluids (Stokesian, Newtonian, and mixed flow regimes), settling types and ratios, elutriation, and classifier types. Classification equipment: Hydrosizer, mechanical classifiers, hydrocyclones, reflux classifier, teetered bed separators, their construction, application, design features and operating parameters. Classifier performance analysis. **Size preparation circuits:** Crushing and grinding circuit examples. Different types of sizepreparation circuits: their relative advantages and disadvantages. Circulating load ratio.	10	2	Knowledge of the industrial classification technology and size preparation practices followed in the industry
	Total	**42**	**14**	**56**

TEXT BOOKS:

1. Wills Mineral Processing Technology by B. A. Wills and J. E. Finch, Elsevier
2. SME Mineral Processing and Extractive Metallurgy Handbook by Robert C. Dunne, SME

REFERENCE BOOKS:

1. Introduction to mineral processing by E. G. Kelly and D. J. Spottiswood, John Wiley & Sons
2. Coal Preparation by J. W. Leonard, AIME
3. The Coal Handbook: Towards Cleaner Production. Volume 1: Coal Production by D. Osborne, Woodhead Publishing
4. Principles of Mineral Dressing by A. M. Gaudin, Tata McGraw-Hill