FINE PARTICLE PROCESSING FOR COAL AND MINERALS

Course Type	Course Code	Name of the course	L	T	P	Credits
DC	FMC207	Fine Particle Processing for Coal and Minerals	3	1	0	10

Course Objective
To give idea of various mineral processing techniques at fine particle size and idea of dewatering technology
Learning Outcomes
Upon successful completion of this course, students will: • be able to acquire the knowledge about the processing of particles at fine size range. • be able to dewater the wet materials generated from mineral processing plants.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	**Introduction:** Fundamentals of fine particle processing.	2	Understanding of basic approach for selection of process based on the properties of material.
2.	**Froth Flotation:** Flotation theory, flotation reagents, laboratory flotation tests. Types of flotation: emulsion flotation, carrier flotation, selective flotation, floc-flotation, skin flotation, reverse flotation, electro flotation. Flotation machine features and functions. Design, selection and sizing. Conventional and modern flotation machines - Column flotation, Jameson Cell etc.	15	This unit will help student in understanding the beneficiation of fine particles based on the surface properties.
3.	**Oil agglomeration:** Principles, process equipment, practices, reagents and application	4	This will help students in selecting the process and equipment related to oil agglomeration process.
4.	**Fluidization:** Principles, process equipment and practices Applications of fluidisation	4	This will enable students to select process related to fluidization for the processing of fines.
5.	**Flocculation and selective flocculation:** Principles, process equipment, practices, reagents, and their selection	4	This will help students to understand the behaviour of particles in liquid to define the process of dewatering and selective flocculation.
6.	**Thickening and filtration:** Thickening fundamentals, basic machine features, different types of thickeners – conventional thickener, high-rate thickener, lamella thickener, deep cone thickener, paste thickening technology etc. Filtration principles, constant rate and constant pressure filtration, filters – vacuum drum filter, vacuum disc filter, filter press, horizontal belt filter. Design, selection and sizing of thickeners and filters	9	This will help student to understand the separation of liquid from slurry i.e. dewatering related processes.
7.	**Drying:** Principles and methods	4	Knowledge of the principles and practice of industrial drying`
	Total	42	

Text Books:

1. Gupta, Ashok, and Denis S. Yan. Mineral processing design and operations: an introduction. Elsevier, 2016.

Reference Books:

1. Kelly, E. G., & Spottiswood, D. J. (1982). Introduction to mineral processing.
2. Gaudin, Antoine Marc. "Principles of mineral dressing." (No Title) (1939).
3. McCabe, Warren L., Julian C. Smith, and Peter Harriott. Unit operations of chemical engineering. McGraw-hill, 1993.
4. Maloney, James O. Perry Chemical Engineers Handbook. The McGraw-Hill Companies, Inc, 2008.
5. Svarovsky, Ladislav. *Solid-liquid separation*. Elsevier, 2000.