COURSE TYPE	COURSE CODE	NAME OF THE COURSE	L	T	P	CREDIT
DE	NFMD502	Dewatering and Drying	3	0	0	3

COURSE OBJECTIVE
The objective of the course is to present understanding of various dewatering (solid-liquid separation) techniques, laboratory equipment, industrial equipment used for dewatering in mineral processing operations.
LEARNING OUTCOMES
Upon successful completion of this course, students will: • have a broad understanding of fundamentals aspects of dewatering. • have a high level concept of dewatering techniques like thickening, filtration and drying. • have a good understanding of various dewatering equipment used in industrial operations. • have good knowledge on selection and operation of dewatering equipment.

UNIT NO.	TOPICS TO BE COVERED	HOURS	LEARNING OUTCOME
1	**Introduction to dewatering and drying:** Introduction, Importance and Challenges, Water associated with unit operations, Moisture determination, Significance of dewatering for concentrate and tailing.	3	This will enable students about the properties of solid particles and their role in dewatering.
2	**Coagulation and Flocculation:** Coagulation and Flocculation, Principles of Coagulation and Flocculation phenomena. Double layer formation, Factors responsible for double layer and its remedies. Mechanism of reagent adsorption in flocculation, different types of flocculants used in dewatering techniques, Selective flocculation and their application.	7	Students will be able to understand the interaction behavior of solid-liquid-reagent and the chemistry behind coagulation & flocculation
3	**Gravity sedimentation and thickening I:** Thickening principles and practices. Determination of settling rates using laboratory tests. Derivation of thickener diameter using Coe and Clevenger equation and Kynche Model**.**	6	This deals with the sedimentation based dewatering equipment, settling of solids, various models for thickener selection.
4	**Gravity sedimentation and thickening II:** Design of thickener, Factors affecting thickener operation and control. Different types of thickeners used in mineral industries such as conventional thickener (Bridge support and column support type), High-rate thickener, Lamella thickener, tray thickener etc.	7	This deals about the design aspects of thickener and industrial application of different types of thickeners.

5	**Filtration:** Principle of filtration, filter media, filter aid. Principle of cake filtration, Factors affecting the filtration. Effect of flocculent on filtration. Filtration type, Constant rate and constant pressure filtration	7	Students will know the basic aspects of filtration, principles, mathematical approach of filtration
6	**Industrial Filters:** Different types of industrial filters – Vacuum drum filter, vacuum disc filter, Horizontal belt filter, Filter Press, etc.	4	This will enable students about the industrial practice of filtration and their selection philosophy.
7	**Centrifuging and Drying:** Principle of thermal dryer, different types of thermal dryers and their application, centrifugal sedimentation. Dewatering using screens **Industrial practice of dewatering:** Application and practices for dewatering processes in mineral industries	8	This deals with the drying technology and their application in mineral processing. This also includes other dewatering methods.
	Total	**42**	

TEXT BOOKS:

1. Wills' Mineral Processing Technology by B. A. Wills and Tim Napier-Munn, Elsevier
2. Introduction to Mineral Processing Design and Operations by A.Gupta and D.S.Yan, SME

REFERENCE BOOKS:

1. Introduction to Mineral Processing by E. G. Kelly, D. J. Spottiswood, SME
2. Unit Operations of Chemical Engineering by Warren L. McCabe, Julian C. Smith, McGraw Hill
3. Perry's Chemical Engineers Handbook by Don W. Green and Robert H. Perry, McGraw Hill