

PROCESS CONTROL AND PLANT LAYOUT

Course Type	Course Code	Name of Course	L	T	P	Credit
DE	FMD462	Process control and plant layout	3	0	0	9

Course Objective

To give concept of various control instruments, process control and plant layout

Learning Outcomes

Upon successful completion of this course, students will understand:

- control instruments, control strategy adopted
- equipment control, plant control operations and plant layout design

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Introduction: Need of process control, technical and economic benefits. Fundamental Aspects-Recognition of dynamic nature of control operation; identification of controllable and non-controllable operating variables; defining control objectives; identification of process and plant constraints.	5	Understanding of basic understanding of various mineral processes and process control.
2	Types of Control Actions: Feed Forward and feedback control; construction of a feedback controller; proportional action, integral action and derivative action; tuning of feedback controllers; multiple input control; ratio control and cascade control.	5	This unit will help student in understanding the various control actions.
3	Instrumentation for measurement: On-line particle size distribution, Metallurgical grade analysis and coal analysis; pulp density, pulp level, froth level, slurry flow rate, ball mill load, pressure, temperature and other required measurements.	8	This will help students in understanding different instruments used in controlling mineral processing plants.
4	Control of plant operations I: Crushing circuit, grinding circuit, flotation circuit, jig circuit and DMC circuit, dewatering and other allied operations. PLC and DCS control systems.	8	This will enable students to select and define control strategy for a plant.
5	Control of plant operations II: Expert systems for plant control. Example of some actual implementation of control systems in an operating plant and the control strategies used.	7	
6	Plant Layout: Introduction of Plot Plan, Contour, Concept of levels, Floors, Location of equipment, etc. Design of Plant layout, Building Layout, Equipment Layout. Input details required to design a plant layout. Major points considered while designing a plant layout. Layout design of plant buildings - crushing, grinding, flotation, dewatering, etc. Introduction to piping layout. Role of civil and structural inputs in layout design.	9	This will help students to understand the design of equipment, building and plant layout.
	Total	42	

Text Books:

S. No.	Resource/Book Name	Author(s)/Editor(s)	Publisher
1	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
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	SME Mineral Processing and Extractive Metallurgy Handbook	Robert C. Dunne, S. Komar Kawatra, Courtney A. Young	Society for Mining, Metallurgy and Exploration
2	Introduction to Mineral Processing	Errol G. Kelly, David J. Spottiswood	John Wiley and Sons
3	Wills' Mineral Processing Technology	Barry A. Wills James Finch	Butterworth-Heinemann