TYPE	COURSE CODE	NAME OF THE COURSE	L	T	P	CREDIT
DC	NFMC508	Flowsheet Design & Plant Layout	3	1	0	4

COURSE OBJECTIVE
• To prepare students for mineral engineering project design, scheduling and execution roles.
LEARNING OUTCOMES
After successful completion of this course, the students will be able to • Carry out balancing of circuits using different bases • Design process flowsheets for various natural resources • Understand the process of acquiring, planning, scheduling and executing projects • Understand the economic aspects of engineering

NO.	TOPICS TO BE COVERED	LECTURE HOURS	TUTORIAL HOURS	LEARNING OUTCOME
1	**Introduction**: Introduction and basic philosophy of flowsheet design. Significance and challenges. **Flowsheet design basics:** Different types of flowsheetsand their definitions; Symbols used in flowsheets per BIS, ASTM and ISO norms. **Data collection:** Basic data required for flowsheet design. Differences in the nature of data for coal preparation and mineral processing.Different approaches adopted for flowsheet design in coal preparation and mineral processing. **Site selection:** Pithead versus central plant. **Material balancing in plant flowsheets:** Solid, water, ash and grade balance calculations for estimating flow rates through significant points. **Capacity estimation and flowsheet selection:** General guidelines for plant capacity estimation; Criteria for optimum flowsheet selection.	7	2	Exposure to the general background of plant design and knowledge of the quantitative aspects of material flow

2	**Coal preparation and mineral processing plant flowsheet design:** Flowsheet development for a coking (metallurgical) coal and a non-coking (thermal) coal washery on single and composite (blended) feed bases, including equipment selection and material balance. Flowsheet development for iron, lead-zinc and copper ore on single and composite (blended) feed basis, including equipment selection and mass balancing with specific numerical examples.	8	4	Familiarization with the practices for the design of coal preparation and mineral processing plant flowsheets
3	**Flowsheet design for other industrial minerals:** Development of flowsheets for placer minerals, limestone, phosphate, quartz, magnesite, kimberlite (diamond-bearing) ores, chromite, manganese ore, gold ore, bauxite, uranium ore, feldspar, mica etc.	8	4	Familiarization with the design of other mineral processing plant flowsheets
4	**Utilities and ancillary equipment**: Application of material handling units; guidelines on plant layout for coal preparation and mineral processing plants. **Environmental issues in plant design:** Addressing the environmental issues in coal preparation and mineral processing at the flowsheet development and plant design stage.	4	0	Knowledge of the application of utilities and plant layout considerations and Understanding of the ways to alleviate or minimize the environmental impact of mineral engineering plants
5	**Application of software:** Development of process flow sheet using MS Excel, ASPEN, etc.	4	2	Familiarization with computer-aided-flowsheet design
6	**Plant Layout I:** Introduction of Plot Plan, Contour, Concept of levels, Floors, Location of equipment, etc. Design of Plant layout, Building Layout, and	6	1	Understanding of the design of equipment, building and plant

	Equipment Layout. Input details required to design a plant layout. Major points considered while designing a plant layout.			layout
7	**Plant Layout II:** Layout design of plant buildings - crushing, grinding, flotation, dewatering, etc. Introduction to piping layout. Role of civil and structural inputs in layout design.	5	1	
	Total	**42 + 14 = 56**		

TEXT BOOKS:

1. Mineral Processing Plant Design by Andrew L. Mular, Roshan Boman Bhappu, SME
2. Project Management: A Systems Approach to Planning, Scheduling, and Controlling by Harold Kerzner, Wiley

REFERENCE BOOKS:

1. Mineral Processing Plant Design, Practice, and Control: Proceedings. Vol. I and II by Andrew L. Mular, Derek J. Barratt, Doug N. Halbe, SME
2. Mineral Processing Design and Operations: An Introduction by Ashok Gupta, Denis Yan, SME
3. Mineral Processing Flowsheets by Denver Equipment Company, Society of Mining Engineers of AIME
4. A Guide to the Project Management Body of Knowledge (PMBOK Guide) by Project Management Institute (PMI), Project Management Institute