



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3172208
Semester – VII
Subject Name: Mine Planning

Type of course: Mining

Prerequisite: Before taking this subject, student must have studied surface and underground mining methods. Student must be aware of the procedures involved in mining.

Rationale: The subject is designed such that the student will learn the strategic planning involved in opening, running and mine closure of surface and underground mines.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
4	0	0	4	70	30	0	0	100

Content:

Sr. No.	Content	Total Hrs
1	<p>Introduction: Stages/Phases of mine life; Preliminary evaluation of surface mining prospects; Mine planning and its importance; All type of grade and its estimation; technical and economic information for planning; Mining revenues and costs, and their estimation; Mine planning components, planning steps and planning inputs.</p> <p>Ore reserve estimation Ore zone and bench/level compositing; Objectives and principles of ore reserve estimation; Estimation of grade at unknown point; Methods of ore reserve estimation - vertical cross section method, horizontal cross section method and 3-D geological block method.</p>	10
2	<p>Surface mine planning</p> <p>Stripping ratio Concept of stripping ratio; Types of stripping ratios and their significance; Choice between surface and underground mining.</p> <p>Feasibility Report - Contents and preparation.</p> <p>Geometrical considerations Basic bench geometry; Ore access; Pit slope geometry; Addition of haul road on pit plan; Pit layouts.</p> <p>Pit Planning Development of economic block model; Pit Cut-off grade and its estimation; Ultimate pit configuration and its determination – hand method, floating cone technique, Lerchs-Grossmann algorithm, and computer assisted hand method.</p> <p>Production planning Determination of optimum mine size and Taylor’s mine life rule; Sequencing by nested pits; Introduction to production scheduling.</p> <p>Analysis and design of highwall slopes and waste dumps</p>	25



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3172208

	Influence of pit slope on mine economics; Highwall slope stability analysis and design methodology; Stability analysis and design methodology for waste dumps. Design of haul roads and drainage system in surface mines; Selection of mining equipment.	
3	Underground Metal Mine Planning Stope planning: Cut-off grade decisions, evaluate stope boundaries, parameters considered for selection of suitable stoping method Production planning: Stope reserve, development, manpower, ore/waste handling, equipment, essential services, production scheduling, Optimization of mine size (mine production capacity) based on techno-economic considerations; Feasibility report and detailed project report: Contents, preparation and economic evaluation.	13
4	Underground Coal Mine Planning Underground Mine Planning: Mine planning components and planning steps; Optimal geometrical mine size; Optimization of mine size (mine production capacity) based on techno-economic considerations; Mine system and sub-systems; Equipment and face scheduling against targeted production: Closure of underground mines. Feasibility Report and Detailed Project Report: Contents, preparation and economic evaluation.	12
5	Mine Closure Planning All legal, technical, social and environmental parameters considered and statutory norms.	

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10 %	40 %	30 %	10 %	10 %	0 %

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

Sr. No.	Author/Editor	Title of Book	Publisher
1.	Jayanta Bhattacharya	Principles of Mine Planning	Allied Publishers Pvt. Ltd.
2.	Carsten Drebenstedt, Raj Singhal	Mine Planning and Equipment Selection	Springer Science & Business Media
3.	Mark Kuchta and W. A. Hustrulid	Open Pit Mine Planning and Design	CRC Press
4.	S. K. Das	Surface Mining Technology	Lovely prakashan
5.	Deshmukh, D. J	Elements of Mining Technology, Vol. I, II & III,	Central Techno Publishers

Course Outcomes:



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering Subject Code: 3172208

Sr. No.	CO statement	Marks % weightage
CO-1	Recognize the basic principles and practical methodologies of mine planning and design a mine plan depending upon various site conditions.	34%
CO-2	Develop optimal strategic mine plans including ultimate pit limit analysis, production scheduling and cut-off grade analysis.	33%
CO-3	Select suitable mining method depending upon the techno- economical and environment friendly conditions.	33%