



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3162210

Semester – VI

Subject Name: Surface Mine Technology

Type of course: Professional Elective course

Prerequisite: Nil

Rationale: The course is designed to help the student in understanding the different surface mining methods, their applicability conditions, merits and demerits, various excavation and transport system. This course is helpful to select suitable and economical method of surface mining and also to gain knowledge about the various difficulties arise during the working in surface 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)	
3	0	0	3	70	30	0	0	100

Content:

Sr. No.	Content	Total Hrs
1	Introduction Surface mining - basic concepts, Scope, applicability and limitations. Classification of surface mining methods applicability, advantages and disadvantages. Types of stripping ratios and their significance, Annual production and life of mine.	06
2	Opening up of deposits Box cut – objective, types, parameters, methods; Factors affecting selection of box cut site; Production benches – formation, parameters and factors affecting their selection.	04
3	Methods of excavation and transport - Cyclic methods- Shovel-dumper operation: Applicability and limitations of electric shovel, hydraulic excavators and dumpers; Cycle time and productivity calculation for shovel and dumper; Dragline operation: Applicability and limitations,, different modes of operation; Side cast diagram and calculation of reach; Cycle time and productivity calculation; Scrapers: Applicability and limitations, various types; Dozers: Applicability and limitations; Types and classification; Method and cycle of operation. Front-end-loaders: Applicability and limitations; Method and cycle of operation. Continuous methods Bucket wheel excavators: Applicability and limitations; Types and principle of operation; Operational methods – lateral block / half block method, full block methods and their corresponding merits and demerits; Calculation of productivity. Continuous surface miners: Types, classification, applicability and limitations; Principles of operation; Operational methods – classification; Wide / full bench method, block mining method and stepped cut method; Empty travel back method, turn back method and continuous mining method; Conveyor / truck loading method, side casting method and	20



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	windrowing method, Respective merits & demerits and applicability & limitations of these methods.	
4	Transport Classification, choice and performance of various transport systems. Dumpers, rail transport, belt conveyers, in-pit crushing and conveying, high angle conveying. Optimization of shovel dumper combination, computerized truck dispatch. Auto truck control. Haul road design.	04
5	Drainage Sources of water, assessment of drainage requirements, sump design and drainage patterns.	04
6	Reclamation Methods of reclamation of mined out areas, dumps and tailings pond.	04

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	20	30	10	20	10

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: 1.Surface Mine Technology..... By S K Das

2. Surface MiningBy G B Mishra

3. Surface MiningBy Bruce A Kennedy

4. Heavy Earth Moving Machineries....By Amitosh De

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Analyze the general and special purpose of utilizing various surface mining machineries with a high degree of adoptability.	20
CO-2	Select suitable surface mining method depending upon various techno economic conditions.	30
CO-3	Design a proper layout and transportation circuits of a surface mine for an expected production.	30



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CO-4	Implement correct measures for mine drainage and reclamation and avoid unsafe operation.	20