

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

**COURSE CURRICULUM
COURSE TITLE: SURFACE MINING
(Code: 3342203)**

Diploma Programme in which this course is offered	Semester in which offered
Mining Engineering	4 th Semester

1. RATIONALE

The diploma holders in mining engineering will be responsible to supervise and control and effective planning and execution of drilling, blasting, excavation and transportation in opencast mine. He should be able to use the suitable type of explosives and machineries for mining operation. This course has been designed to provide knowledge and skills to carryout mining operations in open cast mines. It is one of the very important courses since knowledge of this course is required for day to day operations in mines.

2. COMPETENCY

The course content should be taught and curriculum should be implemented with the aim to develop required skills so that student is able to acquire following competency.

- **Plan and supervise open cast mining operations of bench planning, drilling, blasting and haulage by using appropriate equipment.**

3. COURSE OUTCOMES

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning out comes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

- Compare advantages & disadvantages of Preliminary evaluations of surface mine project
- Determine the amount of explosive required for bench blasting
- Plan operations in open pit mining.
- Describes the operational features of various heavy earths moving machine

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
L	T	P		Theory Marks		Practical Marks		
			C	ESE	PA	ESE	PA	
4	0	2	6	70	30	20	30	150

Legends: L - Lecture; T -Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit; ESE -End Semester Examination; PA - Progressive Assessment

5. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – I Surface Mining	1.a Design a layout for an open cast mine. 1.b Compare advantages & disadvantages of Preliminary evaluations of surface mine project 1.c Prescribe machines for open cast working.	1.1. Advantages & disadvantages of Preliminary evaluations of surface mine project. Pit planning & Design. 1.2. Surface Mining: methods, machines, systems-Coal/Lignite/Mineral O.B. Thickness ratio- stripping ratio.
Unit – II Mine Development	2.a Prepare haul roads and waste dumping sites in open cast mine using equipment.	2.1. Opening out - preparation of haul roads Section of waste dumping sites etc.
Unit – III Drilling & Blasting	3a. Plan benches and blast hole drilling pattern. 3b. calculate the amount of explosive required for bench blasting	3.1 Explosives used in open cast mine. ANFO, SLURRY Explosive, LOX, Emulsion Explosives. 3.2 Formation of Benches, drilling principle, different types of blast hole drills, use of different types of Quarry-Explosives, secondary blasting, problems associated with drilling and Blasting.
Unit – IV Excavation & Transportation	4.a Describe single & multi-bucket excavators. 4.b Explain cyclic and continuous methods of hauling materials. 4.c Explain purpose of various heavy earths moving equipment. 4.d Plan operations in open pit mining.	4.1. Principles of operation of single bucket & multi-bucket excavators. 4.2 Cyclic methods: Shovel-dumpers- pay loaders, drag lines, rippers, scrapers Continuous methods. 4.3 Study of above machinery. 4.4 Conveyors: Stacker Reclaimer- Railway Ropeways. 4.5 Case studies & layout of dumper shovel Combination. 4.6 Open pit slope stability , Ground water Control utilities. 4.7 Organisation structures.
Unit – V Open Cast Mechanisation	5.a Describe the operational features of various heavy earths moving machine.	5.1. Shovel mining, Dragline Mining, Dumpers, Crushers, Conveyors, Deep hole blasting.

6 SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Surface Mining	12	7	3	4	14
II	Mine Development	06	5	2	3	10
III	Drilling & Blasting	16	8	3	5	16
IV	Excavation & Transportation	12	10	4	6	20
V	Open Cast Mechanisation	10	5	2	3	10
Total		56	35	14	21	70

Legends: R = Remember; U = Understand; A = Apply and above levels (Bloom's Revised 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.

7 SUGGESTED LIST OF EXERCISES/PRACTICAL

The practical/exercises should be properly designed and implemented with an attempt to develop required skills (**outcomes in psychomotor and affective domain**) so that students are able to acquire the competencies / programme outcomes. Following is the list of practical exercises for guidance.

*Note: Here only outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of certain outcomes in affective domain which would in turn lead to development of **Course Outcomes** related to affective domain. Thus over all development of **Programme Outcomes** (as given in a common list at the beginning of curriculum document for this programme) would be assured.*

Faculty should refer to that common list and should ensure that students also acquire outcomes in affective domain which are required for overall achievement of Programme Outcomes/Course Outcomes.

S. No.	Unit No.	Practical/Exercise (outcomes in psychomotor domain)	Approx. Hrs. Required
1	III	Observe the use of different types of explosives used in open cast mining, and prepare a report.	2
2	III	Observe sketch of different types of drilling patterns used in O/C Mines.	4
3	III	Observe different methods of secondary blasting in open cast mining, and prepare a report.	2
4	IV	Observe and prepare report of Constructional features & Working methods of Bucket Wheel Excavator	4
5	IV	Observe and prepare report of hydraulic excavators & rope shovel	4
6	V	Observe and prepare report on draglines	4
7	IV	Observe and prepare report on dumpers	4
8	IV	Observe and prepare report on stackers reclaimers.	2
9	IV	Observe and prepare report on Aerial rope ways	2
Total			28

8. SUGGESTED LIST OF STUDENT ACTIVITIES

- i. Report Writing.
- ii. Seminar Presentation.
- iii. Group discussion.

9. SPECIAL INSTRUCTIONAL STRATEGIES (If Any)

- i. Video film of various surface mining projects
- ii. Video film of drilling blasting operation in mines.
- iii. Models showing all essential features of open cast mines.
- iv. Working models of heavy earth moving machineries.
- v. While teaching this subject, it is expected to give practical examples and arrange visit to an open cast mine to show various mining operations.

10. SUGGESTED LEARNING RESOURCES**A. List of Books:**

S. No.	Title of Books	Author	Publication
1	Elements of Mining Technology	D. J. Deshmukh	Central techno publication
2	Surface Mining Technology	Samir kumar Das	Lovely prakashan
3	U.M.S.		Lovely prakashan

B. List of Major Equipment/Materials:

1. Models.

C. List of Software/Learning Websites

- i. <http://en.wikipedia.org/wiki/Mining>www.youtube.com
- ii. <http://www.mining-journal.com/>
- iii. <http://www.miningiq.com/>
- iv. <http://www.mining-technology.com/>
- v. www.nptel.com

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE**Faculty Members from Polytechnics**

- **Prof. S.G Srivastav**, I/c HOD, Department of Mining Engineering, G.P. Bhuj.
- **Prof. R.G Prajapati**, Lecturer, Department of Mining Engineering, G.P. Bhuj.

Coordinator and Faculty Members from NITTTR Bhopal

- **Dr. K .K Jain**, Professor and Dean, department of Mechanical Engineering.
- **Dr. C. K. Chug**, Professor, department of Mechanical Engineering.