

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

**COURSE CURRICULUM
COURSE TITLE: MINING II
(COURSE CODE: 3352201)**

Diploma Programme in which this course is offered	Semester in which offered
Mining Engineering	5 th Semester

1. RATIONALE

The diploma holders in mining engineering will be responsible to supervise the shaft sinking operations, drift drivage operation & support erection operation in underground mines. Students should be able to select the suitable ground, drilling pattern, explosives & shot firing with its tools in shaft sinking operation & drift drivage for developing access to underground mines &/or connecting two individual/separate mine parts. This subject provides students basic knowledge of shaft sinking, drift drivage & support erection operations, its associated problems & remedies which will make him able to supervise respective operations.

2. LIST OF COMPETENCY

The course content should be taught and with the aim to develop required skills in students so that they are able to acquire following competency:

- **Develop safe and workable mines accesses including shaft sinking, drift drivage & erection of supports at work places.**

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 outcomes in cognitive, psychomotor and affective domain to demonstrate following course outcomes

- Explain safe drivage of mine accesses including shaft and inclines.
- Draw a support plan for the workplace in the underground mine.
- Explain modern methods of roof support to create a safe working conditions.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	PA	ESE	PA	150
3	0	2	5	70	30	20	30	

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

5. COURSE DETAILS

Unit	Major Learning Outcomes (outcomes in cognitive domain)	Topics and Sub-topics
Unit – I Shaft & its Sinking operation:	<p>1a: Explain types of Shaft with its applicability.</p> <p>1b: Describe shaft sinking operation.</p> <p>1c: Explain special methods of shaft sinking with its applicability.</p>	<p>1.1 Shaft- Vertical & Inclined; its applicability</p> <p>1.2 Preliminary Consideration of Shaft Sinking operation:- Site selection, Shape, size & sinking operation.</p> <p>1.3 Shaft Sinking operation: (i) Sinking up to Rock head. (ii) Sinking through strata below Rock Head – Drilling, Blasting, mucking.</p> <p>1.4 Shaft Centring operation.</p> <p>1.5 Temporary Support of shaft sides.</p> <p>1.6 Erection of Permanent lining- Brick walling, Monolithic concrete lining, Cast iron tubing.</p> <p>1.7 Ventilation, Lighting & dealing with water during Shaft sinking.</p> <p>1.8 Special methods of Shaft sinking- Piling system, Caission methods, Freezing method, Cementation process along with its applicability.</p>
Unit – II Drift/ Tunnel & its driving operation:	<p>2a. Define drift</p> <p>2a1. Explain its advantages.</p> <p>2b. Explain drift drivage operation.</p> <p>2c. Describe Ventilation arrangements in short & long Drift</p>	<p>2.1 Drift & Tunnel- Definitions & advantages of drift over staple shaft.</p> <p>2.2 Drift drivage operation: drilling, blasting, mucking.</p> <p>2.3 Ventilation arrangements in short & long Drift.</p>
Unit – III Mine Supports	<p>3a. Explain properties of various types of roofs.</p> <p>3b. Describe various types of supports with its applicability & limitations.</p> <p>3c. Describe roof bolting & stitching.</p> <p>3d. Compare Iron & Steel- advantages over timber</p>	<p>3.1 Properties of various types of roofs.</p> <p>3.2 Draw a plan of support in a mine.</p> <p>3.3 Roof testing methods and analysis.</p> <p>3.3 Materials employed for supports- (i) Timber- Setting props, Timber bars, Safari supports & side supports; Systematic timbering; Withdrawal of supports. (ii) Iron & Steel- advantages over timber; Yielding props, Friction props, Hydraulic props, Friction Vs. Hydraulic props.</p> <p>3.4 Clearing up heavy roof fall.</p> <p>3.5 Roof Bolting – Principle of action, common types, advantages.</p> <p>3.6 Roof Stitching.</p>

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
1	Shaft & its Sinking operation	15	5	10	10	25
2	Drift/ Tunnel & its driving operation	13	4	8	8	20
3	Mine Supports	14	5	10	10	25
Total		42	14	28	28	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 different types of skills (*outcomes in psychomotor and affective domain*) so that students are able to acquire the competencies/course outcomes. Following is the list of practical exercises for guidance.

Note: outcomes in psychomotor domain are listed here 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 members 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)	Apprx. Hrs. Required
1	I	Design temporary lining during shaft sinking.	4
2	I	Design permanent lining during shaft sinking.	4
3	I	Design various drilling & blasting pattern for shaft sinking with its purpose.	4
4	II	Prepare models of different types of special methods of shaft sinking.	4
5	II	Design different types of blast hole patterns in drift drivage/tunnelling with its purpose.	4
6	III	Perform erection & withdrawal of Timber, Hydraulic & friction props.	4
7	III	Design different ways of supporting road way & roadway junctions.	4
		Total	28

8. SUGGESTED LIST OF STUDENT ACTIVITIES

- i. Seminar Presentation based on study of different topics by exploring internet.
- ii. Group discussions on different topics.

9. SPECIAL INSTRUCTIONAL STRATEGIES (If Any):

- i. Ask students to visit nearby mines and study different types of mine accesses and prepare a report on it.
- ii. Show pictures/films of different mines accesses including shaft sinking, drift drivage & erection of supports.

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

S. No.	Title of Books	Author	Publication
1	Elements of Mining Technology - I	D. J. Deshmukh	Central techno publication
2	Modern Coal Mining Technology	S.K.Das	Lovely Prakashan
3	Underground Metalliferous Mining Methods	Y.P.Chacharkar	Lovely Prakashan
3	U.M.S.	-	Lovely Prakashan

B. List of Major Equipment/Materials:

- i. Models.
- ii. Video Films

C List of Software/Learning Websites

- i. Wikipedia.
- ii. www.youtube.com

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

- Prof. S.G Srivastav, (I/c HOD) Lecturer, G.P.Bhuj
- Prof. P.Y Trivedi, Lecturer, G.P.Bhuj

Coordinator and Faculty Members from NITTTR Bhopal

- Prof. K .K Pathak, Prof. Dept. of Civil & Environment Engineering
- Prof. Peeyush Verma, Professor, Department of Vocational Education & Entrepreneurship Development