GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

Course Curriculum

MINING-I
(Code: 3332202)

Diploma Programme in which this course is offered	Semester in which offered
Mining Engineering	3rd semester

1. RATIONALE

The mining engineers are responsible to supervise the drilling and blasting operations in mine. He/She should be able to select the suitable explosives, blasting/ shot firing tools and suitable kind of blasting in mines. This course therefore provides would be mining engineers basic knowledge of explosives, blasting/ shot firing tools and blasting methods which will make them able to supervise drilling and blasting operations.

2. COMPETENCY (Programme Outcome according to NBA Terminology)

The course should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency:

- **Plan and supervise drilling and blasting operations in mining following safe practices.**

3. TEACHING AND EXAMINATION SCHEME

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

4. COURSE DETAILS

Unit	Major Learning Outcomes (Course Outcomes in Cognitive Domain according to NBA terminology)	Topics and Sub-topics
Unit – I Drilling	1a. Describe principles, types and purpose of drilling. 1b. Describe principle, construction and working various kinds of rock drill machines. 1c. Explain functioning of pneumatic tools and bits.	1.1 Drilling- Purpose, Principle and Types 1.2 Rock drill machines: principle, construction and working of Pneumatic, hydraulic, and electric rock drill machines. 1.3 Drilling pneumatic tools and bits.
	1d. Explain core recovery operations. 1e. Explain the methods of borehole Surveying.	1.4 Core Recovery- Tube Barrels, its types and applicability. 1.5 Troubles during boring operations and its remedies. 1.6 Chief uses of drill holes. 1.7 Borehole Survey
	1f. Describe manual & mechanized Percussive Drilling process.	1.8 Percussive Drilling: Manual, Mechanised, its feed mechanism and its cutting tools.
Unit – II Explosives	2.a Describe different types, properties and constituents of explosives. 2.b Explain types, Construction and importance of detonators. 2.c Describe Construction and its importance of safety fuse. 2.d Explain purpose, construction and safety features of Magazine. 2.e Describe safety involved during handling of explosives.	2.1 Explosives- Definition, constituents and its properties 2.2 Classification of explosives: ♣ Low and High Explosives ♣ Permitted and Non-permitted explosives 2.3 Detonators: types, Construction and its importance. 2.4 Safety fuse Construction and its importance. 2.5 Detonating fuse- Construction and its importance. 2.6 Magazine - layout, construction and safety features. 2.7 Safe handling of explosives.

Unit	Major Learning Outcomes (Course Outcomes in Cognitive Domain according to NBA terminology)	Topics and Sub-topics
Unit – III **Blasting:**	3.a Explain types, construction and safety of exploders. 3.b Describe blasting practices in mines. 3.c Explain purpose, advantages, limitations and precautions of solid blasting. 3.d Calculate blasting efficiency. 3.e Describe various accidents and their causes due to explosives. 3.f Explain statutory procedure for removal of misfired shots.	3.1 Exploders: types, construction and safety features. 3.2 Blasting practices in mines: ➢ Shot-firing tools ➢ Preparation of charge ➢ Procedure for firing shots ➢ Direct and Indirect initiation 3.3 Solid blasting: Concept, advantages, limitations and precautions. 3.4 Blasting with free face. 3.5 Blasting efficiency- explosive quantity, powder factor and detonator factor 3.6 Causes of accidents from explosives-blown through shots, Sockets, Misfired shots its causes, dangers and statutory procedure of its removal.
Unit – IV Alternate to explosives:	4.1 Describe alternate explosives to conventional explosives. 4.2 Compare merits and demerits of these alternate explosives.	3.4 Alternate to explosives- Cordex, Hydrox, Hydraulic burster, Armstrong air breaker, their advantages and disadvantages.

5. SUGGESTED SPECIFICATIONTABLE WITH HOURS and MARKS (Theory)

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
1	Drilling	10	4	8	7	19
2	Explosives	12	4	8	8	20
3	Blasting	16	7	9	9	25
4	Alternate To Explosives	04	1	2	3	06
Total		**42**	**16**	**27**	**27**	**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.

6. SUGGESTED LIST OF EXERCISES/PRACTICALS

The practical/exercises should be properly designed and implemented with an attempt to develop different types of practical skills **(Course 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 course outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of **Programme Outcomes/Course Outcomes in affective domain** as given in a common list at the beginning of curriculum document for this programme. Faculty should refer to that common list and should ensure that students also acquire those Programme Outcomes/Course Outcomes related to affective domain.

S. No.	Unit No.	Practical/Exercise (Course Outcomes in Psychomotor Domain according to NBA Terminology)	Apprx. Hrs. Required
1	I	Dismantle & assemble accessories of boring machines and boring rig	4
2	I	Dismantle & assemble the boring and fishing tools	2
3	I	Dismantle & assemble Hydraulic feed mechanism of the drilling machine	4
4	I	Observe and sketch of double tube core barrel	4
5	II	Observe and explain various types of detonators and relay	4
6	II	Observe and describe different types of exploders	2
7	III	Observe and describe construction and use of stemming rods, scraper, break detector, blasting cable, circuit tester.	2
8	II	Visit, describe with sketch an approved types of magazines	2
9	III	Observe, explain and sketch different types of initiation	2
10	IV	Observe, explain and sketch Hydraulic Burster and Cordex.	2
		Total	**28**

7. SUGGESTED LIST OF STUDENT ACTIVITIES

i. Report Writing.
ii. Seminar Presentation.
iii. Mini project.
iv. Tutorial and field assignment.

8. SPECIAL INSTRUCTIONAL STRATEGIES (If Any)

i. Visit to nearby mines
ii. Video films on working of different type of mines from YouTube.

9. 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 Latest edition
2	Introduction to Mining	Lewis and clark	J. Wiley. Latest edition
3	Drilling Technology	Chugh	Oxford and IBH publication, Latest edition

B) List of Major Equipment/Materials:

i. Model of scrapper.
ii. Model of Exploders.
iii. Model of boring and fishing tools.
iv. Models of detonators.

C) List of Software/Learning Websites

i. Mining journals
ii. www.gmdcltd.com
iii. www.cil.com

10. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Prof. S.G. Srivastav**, I/c HOD, Department of Mining Engineering, G.P. Bhuj
- **Prof. P.Y. Trivedi**, Lecturer, Department of Mining Engineering, G.P. Bhuj
- **Prof. M .V. Ramanuj**, Lecturer, 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 Pathak**, Professor. Dept. of Civil and Environment Engineering
- **Prof. P. Verma**, Professor and Co-ordinator for State of Chattishgarh,