

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

**COURSE CURRICULUM
COURSE TITLE: MINING HAZARDS & SAFETY
(COURSE CODE: 3352204)**

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 keep mines safe from hazards and any type of danger. It is his responsibility to inspect and supervise all the working areas where any symptoms of any danger or hazardous situation may be arise. He should be able to select the suitable rescue apparatus. This subject provides him basic knowledge of mine fires, hazards in mines preventive measures and its rescue and recovery operation.

2. LIST OF COMPETENCY

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

Observe safe practices in mines against the unsafe and hazardous situation in mining to maintain the safe working conditions.

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.

- i. Identify and declare a condition safe or unsafe depending upon conditions and criterion presented about the mines.
- ii. Deal Safely with spontaneous heating of coal.
- iii. Deal with coal dust and inundation situations.
- iv. Design safety inspection plan to mitigate problems related to ventilation and fire.

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		
L	T	P	C	ESE	PA	ESE	PA	150
4	0	2	6	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 CONTENT DETAILS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – I Mine Fires	1a: Explain and deal with any type of fiery condition with suitable measures. 1b: State the steps to maintain safety standards within fiery Zone. 1c: Describe the procedure to collect air samples to know the condition of fire area. 1d: List the actions required to be taken to recover the fire area. 1e: Describe the actions to deal with any type of fire. 1f: State the steps to operate any type of fire extinguishers.	1.1 Underground & quarry fires: Causes of mine fires, Dealing with mine fires, Sealing off different types of stopping, construction & purposes. 1.2 Pressure balancing to control air leakage into sealed off fire-areas. 1.3 Methods of collection of air samples from sealed off fire - areas and from mine atmosphere. 1.4 Recovery of sealed off mine working on account of fire by reopening. 1.5 Dealing with fire in Debris, Coal pillars & coal stocks. 1.6 Different types of fire extinguishers safety & statutory aspects.
Unit – II Spontaneous Heating of Coal	2a. Describe the steps to measure crossing point Temperature of coal. 2b. Describe the methods to prevent spontaneous heating by suitable measure. 2c. Explain and diagnose spontaneous heating of coal and design a panel. 2d. Describe the methods to inspect and maintain adequate ventilation	2.1 Different stages: Determination of proneness of coal by crossing point. 2.2 Factors governing proneness to spontaneous combustion. 2.3 Detection of spontaneous heating symptoms, Preventive measures, including panel system layout. 2.4 Adequate ventilation provisions in design stages, Regular inspections etc.
Unit – III Mine Explosion	3a. Describe the reasons for fire damp explosion and coal dust explosion. 3b. Describe the steps to adopt precautionary measures against fire damp explosion and coal dust explosion.	3.1 Limits of inflammability & various factors influencing the fire damp Explosion. Causes of fire damp explosions, Preventive measures. 3.2 Factors affecting inflammability of coal dust, Causes of & preventive measures against coal dust Explosions. 3.3 Various stone dust, Types &

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
	3c. Describe the methods to provide and maintain suitable stone dusting in mines.	efficiency, Stone dusting, Stone dust barriers water barriers & triggered Barriers.
Unit – IV Mine Inundation:	4a. Explain inundation of water in mines 4a. Describe the methods to deal with such water which causes inundation in mines. 4b. Describe the design of an appropriate barrier in a particular Situation. 4c. List the steps to utilise safety boring machine 4c. Describe the demonstration of its (safety boring machine) working with safety measures.	4.1 Causes of inundation by surface & underground water both in opencast & Underground mines. 4.2 Design and construction of Boundary Barriers, Panel barriers, Water dams. 4.3 Precautions while Approaching water-logged workings, by means of Long boreholes patterns by burn side boring apparatus, Safety & statutory aspects.
Unit – V Mine Rescue & Recovery Work:	5a. State the steps to maintain all the statutory aspects related with mine rescue and recovery. 5b. Explain and maintain all type of rescue apparatus as per the need. 5c. State the steps to maintain all type of rescue apparatus 5d. Describe the actual rescue operation in mines.	5.1 What is mine Rescue & Recovery and its Scope. Rescue organization, Rescue stations, Rescue teams- Selection Initial & refresher trainings. 5.2 Rescue apparatus self contained portable breathing apparatus, Gasmasks, Smoke helmets, Self Rescuers, Reviving apparatus with actual rescue operations. 5.3 Fresh air base, Life lines & communication, Actual operations survival techniques use of bore holes in rescue operations.

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	Mine Fires	13	03	06	05	14
2	Spontaneous Heating	10	04	05	05	14
3	Mine Explosion	13	03	07	04	14
4	Mine Inundation	10	02	08	04	14
5	Mine Rescue & Recovery Work	10	04	06	04	14
Total		56	16	32	22	70

Legends: R = Remember; U = Understand; A = Apply 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.

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.

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills so that students are able to acquire the competency.

Following is the list of experiments for guidance.

S. No.	Unit No.	Practical / Exercise (outcomes in psychomotor domain)	Approx. Hrs. Required
1	II	Detect Spontaneous Heating of coals and its various stages and preventive measures.	4
2	II	Select and design a method of sealing of a fire area.	4
3	II	Inspect and maintain different types of fire extinguishers.	4
4	II	Collect air sample from a sealed off area by using various methods.	4
5	III	Design various types of stone dust barriers.	4
6	IV	Explain operation of Burn Side Safety Boring machine.	4
7	V	Operate and maintain various Rescue apparatus.	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-II	D. J. Deshmukh	Central techno publication
2	U.M.S.	-	Lovely Prakashan
3	Mine Hazards & safety	M.A Ramlu	Lovely Prakashan

B. List of Major Equipment/Materials:

1. Models.
2. Apparatus.

C List of Software/Learning Websites

1. Wikipedia.
2. www.youtube.com

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

- **Prof. S.G Srivastav**, (I/c HOD) Lecturer, G.P.Bhuj
- **Prof. M.V Ramanuj** Lecturer, G.P Bhuj

Coordinator and Faculty Members from NITTTR Bhopal

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