

GUJARAT TECHNOLOGICAL UNIVERSITY

BRANCH NAME: Mining Engineering

SUBJECT NAME: Mine Ventilation

SUBJECT CODE: 2162207

B.E. 6th SEMESTER

Type of course: Mining

Rationale:

The degree holders in mining engineering will be responsible to keep underground mines in comfortable working conditions & safe by ensuring brisk ventilation. They should be able to select the suitable fans & drive as well as select proper airways to ventilate whole mine &/or it's various parts, economically.

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)		
				PA	ALA	ESE	OEP			
3	0	2	5	70	20	10	20	10	20	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Mine Gases : Mine atmosphere its composition, toxicity of gases, mine gases – Origin, occurrence, composition, physiological effects and their detection.	6	14 %
2	Heat and Humidity in Mines : Rock temperature geothermic gradient auto-compression, Humidity & Relative humidity, its determination and effects. Metabolism and respiration. Climate conditions, Kata thermometer assessment of comfort conditions. Control of temperature and humidity in deep mines. Air-conditioning in mines.	8	24 %
3	Ventilation : Necessity and standard for ventilation, Flow of air in ducts and mine roadways, resistance of airways, Coward`s Diagram.	4	10 %
4	Law of ventilation : Chezy's and Atkinson's equation, Equivalent resistance of mines, equivalent orifice, mine characteristics.	6	14 %

5	Natural ventilation and its measurement, Thermodynamics of ventilation and determination of pressure volume diagram, Mine fans, principal types, their construction and working, characteristics and suitability, booster and auxiliary fans, venturi and air jets.	8	24 %
6	Installation of fans, air locking arrangement, design of evasee, parallel and series operations of mines fans.	6	14 %

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
58 %	22 %	14 %	2 %	2 %	2 %

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:

Sr. 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 Environment & Ventilation.	G.B.Mishra	Lovely Prakashan

Course Outcome:

After learning the course the students should be able to:

- i. Assess quality of air in mine atmosphere.
- ii. Comprehend principles of ventilation to improve quality of atmosphere in underground mines.
- iii. Comprehend various types of Mine fans and their installation to maintain and improve ventilation in underground mine.

List of Experiments:

S. No.	Practical / Exercise	Appox. Hrs. Required

1	Determination of relative humidity by whirling hygrometer.	4
2	Determination of cooling power of the mine air by using kata thermometer.	4
3	Measurement of air velocity, quantity and pressure in a duct by using a pitot tube.	4
4	Measurement of pressure in underground mine by using Inclined Manometer	4
5	Design and Describe air crossing, regulator, Ventilating door, air lock at pit top etc.	4
6	Find out CH ₄ % in a gassy mine by using different types of flame safety lamps.	2
7	Analyze mine gases which are found behind a sealed off fiery area.	4
8	Determination of O ₂ and CO gas percentage by using O ₂ & CO detector.	2
	Total	28

Major Equipment:

- i. Models.

List of Open Source Software/learning website:

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

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.