GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3162207
Semester – VI
Subject Name: Mine Ventilation

Type of course: Professional Core Course (Mining)

Prerequisite: Before learning this course student should have detailed knowledge of development, working and closure in an underground mine.

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

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
4	0	2	5	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1.	**Composition of mine atmosphere**: Mine gases-production, properties and effects; Sampling and–Composition of mine atmosphere: Mine gases analysis of mine air; Methane content; Methane drainage; Flame safety lamp and its uses; Methanometers; Methane layering; Radon gas and its daughter products; Monitoring of gases.	**12**
2.	**Heat and humidity:** Sources of heat in mines; Effects of heat and humidity; Psychrometry, Kata thermometer; Air-conditioning.	**6**
3.	**Air flow through mine openings:** Laws of flow, resistance of airways, equivalent orifice, losses in airways, distribution of air, economic design of airways; Flow control devices; Permissible air velocities in different types of workings/openings; Standards of ventilation.	**12**
4.	**Natural ventilation:** Causes, effect of seasonal variations, calculation of NVP from air densities, thermodynamic principles and other methods.	**6**
5.	**Mechanical ventilation:** Types of mine fans; Theory, characteristics and suitability of fans; Selection, testing and output control; Fans in series and parallel; Forcing and exhaust configurations; Reversal of flow; Fan drifts, diffusers, evasees; Booster and auxiliary ventilation; Venturi blowers; Ventilation of deep underground and open pit.–mines	**12**
6.	**Ventilation planning:** Planning of ventilation systems and economic considerations; Ventilation layouts for mining of coal and ore deposits; Ventilation of workings/stopes using heavy blasting; Calculation of air quantity required for ventilating a mine;	**12**

	Calculation of total mine head; Network analysis principles and computer applications; Automation and remote control of ventilation installations; Ventilation surveys.	

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20%	**30%**	**30%**	**10%**	**10%**	**0%**

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.	Mine environment and ventilation	G.B.Mishra	Lovely Prakashan
2.	Elements of mining technology-II	D.J.Deshmukh	Central techno publication
3.	U.M.S.	-	Lovely Prakashan

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Analyse and control mine atmosphere.	30%
CO-2	Plan ventilation in an underground mine.	40%
CO-3	Perform ventilation survey.	30%

List of Experiments:

Sr. No.	**Title of Experiment**	**Hrs.**
1.	Determination of relative humidity by Whirling Hygrometer.	4
2.	Estimation of air cooling power of the mine air by using Kata thermometer.	4

3.	Measurement of air flow using velometer, vane anemometer and pitot tube.	4
4.	Measurement of pressure in underground mine by using Inclined Manometer.	3
5.	Plotting of fan characteristic curves.	4
6.	Flame safety lamp-construction and gas testing.	4
7.	Study and use of MSA-D6 methanometer.	4
8.	Detection of carbon monoxide using detector tube.	3