

**Course Name** : Three years Diploma in Mining Engineering  
**Year** : Second  
**Subject Title** : **MINE VENTILATION**  
**Subject Code** : **M206**

**Teaching and Examination Scheme:**

Teaching Scheme*			Examination Scheme					
L	T	P	Full Marks	External Exam Marks	Internal Exam Marks	External Pas Marks	Total Pass Marks	Duration of External Exams
2	0	0	100	80	20	26	40	3 Hrs.
Practical (MI 212)		2	100	80	20	26	40	4 Hrs.

\*Duration of year is considered 28 weeks

The underground working is devoid of the natural air. As such to make the working places safe for the persons to work and pass it is necessary to circulate the air artificially through the mine working. A mining engineer must know the principles of how the flow of air can be created, regulated, controlled and monitored. They must also know the effect of the heat and humidity, condition and means of measuring and controlling the same. Number of mine gases is produced in the mine, which has got dangerous and toxic properties. The mining engineer should have knowledge of source of these gases their measurement detection and dealing with these aspects of knowledge essential for mining engineer.

**COURSE OUTCOMES:**

After undergoing the course of study the student shall be able to

1. Take measurement of quantity of air, pressure, humidity and cooling power of the mine air, and take corrective action if these do not meet the desired standards.
2. Detect presence of inflammable and toxic/noxious gases in the mine and take precautions to remove the some and make the working places safe.
3. Provide and maintain ventilation appliances in their districts so as to ensure compliance with standards of ventilation prescribed.
4. Generally appreciate the ventilation system of a mine as a whole and importance of maintaining safe and comfortable working conditions inside the mine.

Unit	Content	Contact Hours	Marks
1.	<p><b>MINE AIR</b></p> <p>1.1. Different Gases / Damps found in mines, Definition of damps, their threshold limits, physiological effects, source of production and detection, Degree of gassiness of seam.</p> <p>1.2. Flame safety lamps, its principle, construction, safety features, and comparison. Detection of Methane by flame safety lamp.</p> <p>1.3. Methanometer its principle of working, construction. Principle of other method of detection of methane (description of equipment not required)</p>		
2.	<p><b>MINE CLIMATE</b></p> <p>2.1. Purpose and standards of ventilation, standards for minimum &amp; maximum velocity of air for different locations.</p> <p>2.2. Pressure, ventilating press, watergauge.</p> <p>2.3. Temperature, sources of heat in mines.</p> <p>2.4. Moisture content of mine air relative humidity, wet bulb temperature, measurement of relative humidity.</p> <p>2.5. Cooling power of mine air, determination of cooling power, methods of improving cooling power of mine air, effect of heat and humidity on miners.</p>		
3.	<p><b>NATURAL VENTILATION</b></p> <p>Natural ventilation Pressure, geothermic gradient, Factors causing NVP, Effect of seasonal changes on direction of Natural ventilation, limitation of Natural ventilation. Motive column, calculation of natural ventilation pressure.</p>		
4.	<p><b>ARTIFICIAL VENTILATION</b></p> <p>4.1. Different types of fans used in mines: centrifugal &amp; axial flow, their principle of working, Exhaust &amp; forcing type. Purposes of evasee &amp; volute casing. Reversal of air current, and characteristics curves of fans. Fans in series and parallel,</p> <p>4.2. Comparison between axial flow &amp; Centrifugal fan; exhaust &amp; forcing Fan.</p> <p>4.3. Fan laws, Manometric efficiency overall</p>		

	<p>efficiency, theoretical depression produced by fan.</p> <p>4.4. Numerical on fan laws.</p>		
5.	<p><b>DISTRIBUTION &amp; COURSING OF AIR IN MINES</b></p> <p>5.1. Laws of air flow in Mines, Atkinson's formula splitting, advantages &amp; disadvantages, Numerical on splitting, equivalent orifice. Numerical on equivalent orifice.</p> <p>5.2. Ventilation appliances, Auxiliary ventilation: Different methods, advantages &amp; disadvantages, hazards associated with auxiliary ventilation, precautions required.</p> <p>5.3. Booster fan: purpose, dangers associated, Precautions before installation. Numerical on Booster fan,</p> <p>5.4. Ascensional and Descensional ventilation, Advantages and disadvantages.</p>		
6.	<p><b>VENTILATION SURVEY</b></p> <p>6.1. Scope and importance of ventilation survey, survey interval and location of survey station, ventilation plan.</p> <p>6.2. Measurement of quantity &amp; pressure difference, anemometer, pitot static tube, Manometer.</p> <p>6.3. Conduct of Pressure &amp; quantity survey, precautions during and before conducting ventilation survey.</p>		

#### **PRACTICAL:**

1. Demonstration of co-detector and measurement of carbon monoxide using Co-detector.
2. Demonstration of Methanometer and measurement of methane using Methanometer.
3. Dismantling & assembling of different types of Flame safety lamps.
4. Detection of Methane using flame safety lamp
5. Demonstration of whirling hygrometer and determination of relative humidity using whirling hygrometer.
6. Demonstration of Kata thermometer and determination of cooling power by Kata thermometer.
7. Demonstration of water gauge and measurement of fan water gauge.
8. Demonstration of centrifugal mine fan.
9. Demonstration of Reversal arrangement of centrifugal mine fan.
10. Demonstration of Axial flow fan.
11. Demonstration of various ventilation devices.

12. Demonstration of vane Anemometer and determination of quantity by Anemometer.
13. Demonstration of velometer and measurement of air velocity by velometer.
14. Demonstration of Inclined manometer and pitot static tube and determination of velocity pressure.
15. Study of ventilation plan and conventional signs used in it.

**STRATEGY OF IMPLEMENTATION:**

Conducting theory classes, practical, Industrial visits seminars group discussion, and assignment on different topics shall complete the curriculum for the subject.

**REFERENCE BOOKS:**

<b>Author</b>	<b>Title</b>	<b>Publisher</b>
<b>D.J. Deshmukh</b>	<b>Elements of Mining Technology Vol II</b>	<b>Central techno publication, Nagpur</b>
<b>G.B. Misra</b>	<b>Mine Environment &amp; Ventilation</b>	<b>Oxford University Press, Calcutta</b>
<b>M.A. Ramlu</b>	<b>Mine Disaster &amp; Mine Rescue</b>	<b>Oxford University Press, Calcutta</b>