



IIPM SCHOOL OF ENGINEERING & TECHNOLOGY

LESSON PLAN: 2023-24

Sub: Th.3- Mine Ventilation (MV)

Branch : Mining Semester : 4th
 Faculty name : Soumya Ranjan Dash
 Duration : 60 hours
 Syllabus :

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| UNIT 01 | Natural Ventilation o Definition of natural ventilation and factors affecting natural ventilation. o Describe the different types of Thermometer. o Describe the different types of Barometer. o Describe kata thermometer. o Describe water gauge. o Calculate ventilation pressure by using pitot static tube. o Explain effects of heat & humidity. o Explain natural ventilation motive column, geothermic gradient. o Enumerate laws of mine air friction and solve problems on above. o Statutory provision as per CMR 2017, MMR 1961. |
| UNIT 02 | Air Crossing and distribution o Describe ventilation stopping, air crossing, ventilation door, brattice partition. o Describe different types of ventilation. o Accessional & declensional ventilation. o Homotropical & Antitropical ventilation. o Boundary ventilation. o Central & combined ventilation. o Explain splitting of air current & solve numerical problems on splitting. o Describe air locks at pit top. |
| UNIT 03 | Mechanical Ventilation o Explain construction & principle of operation of centrifugal flow fans. o State fan laws & calculate fan efficiency and capacity. o Explain installation of mine fan with reversal arrangement. o Describe fan drift, fan drive, evasee and diffusers. Explain fan characteristics and mine characteristics. o Describe methods of output of mine fans. |
| UNIT 04 | Booster fan and its Effects o Describe installation, location and purpose of booster fan. o Solve problems relating to booster fan. |
| UNIT 05 | Auxiliary Ventilation o Describe systems of auxiliary ventilation. o Describe advantages & disadvantages of auxiliary ventilation. |
| UNIT 06 | Ventilation Survey o Describe methods of pressure survey using barometer, gauge and pitot tube with manometer. o Describe the method of measurement of cross-sectional area. |

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| | <ul style="list-style-type: none"> o Describe the method of velocity measurements by using anemometer, voltmeter, and pitot-static tube and smoke & cloud method. o Determine percentage of oxygen, methane, carbon monoxide SO₂ & H₂S. |
| UNIT 07 | Leakage of air in Mines <ul style="list-style-type: none"> o Describe causes and preventive measures of leakage of air in mines. |

Books Suggested:

- Mine Ventilation G B Mishra
- EMT II D J Deshmukh
- Mine Ventilation L C KAKU

Objective :

- o Describe different instruments measuring temperature, pressure and humidity and have idea on natural ventilation and laws of mine air friction.
- o Describe different types of ventilation and methods of air crossings and distribution.
- o Illustrate different types of fans, fan characteristics, Mine characteristics and selection of fans.
- o Identify different locations of booster fan and solve simple problems relating to this.
- o Explain different systems of auxiliary ventilation and its advantages and disadvantages.
- o Explain different ways of pressure survey, quantity survey & quality survey.
- o Explain causes & preventives measure of leakage of air in mines.

Learning Outcome: The provision of proper ventilation is very essential for any underground mining operation. As a mining Engineer, one should have the thorough knowledge of types of ventilation, methods of air crossing, types of fans etc

| Sl. No | Chapter | Proposed Week for Teaching | Lecture No. | Sub. Topic | Important Teaching Points | Content Source |
|--------|---------|----------------------------|-------------|---------------------|---|-----------------------|
| 1 | I | I | 01 | Natural Ventilation | Definition & Factors affecting natural ventilation | G B Mishra LC kaku |
| 2 | | | 02 | Natural Ventilation | Types of thermometer & kata thermometer | G B Mishra LC kaku |
| 3 | | | 03 | Natural Ventilation | Types of barometer Water gauge | G B Mishra LC kaku |
| 4 | | | 04 | Natural Ventilation | Ventilation pressure by piton static tube Effects of heat & humidity | G B Mishra LC kaku |
| 5 | | II | 05 | Natural Ventilation | natural ventilation motive column, geothermic gradient. | G B Mishra LC kaku |
| 6 | | | 06 | Natural Ventilation | laws of mine air friction and problems | G B Mishra LC kaku |
| 7 | | | 07 | Natural Ventilation | Statutory provision as per CMR 2017,MMR 1961 | G B Mishra LC kaku |

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| | | | | | | | |
| 8 | | | 08 | Natural Ventilation | Unit Test-I Revision | | |
| 9 | II | III | 01 | Air Crossing & Distribution | Ventilation stopping, air crossing, ventilation door, brattice partition. | D J Deshmukh UMS Vol-I | |
| 10 | | | 02 | Air Crossing & Distribution | Different types of ventilation | D J Deshmukh UMS Vol-I | |
| 11 | | | 03 | Air Crossing & Distribution | Accessional & declensional ventilation | D J Deshmukh UMS Vol-I | |
| 12 | | | 04 | Air Crossing & Distribution | Homotropical & Antitropical ventilation. | D J Deshmukh UMS Vol-I | |
| 13 | | | 05 | Air Crossing & Distribution | Boundary ventilation | D J Deshmukh UMS Vol-I | |
| 14 | | IV | 06 | Air Crossing & Distribution | Central & combined ventilation | D J Deshmukh UMS Vol-I | |
| 15 | | | 07 | Air Crossing & Distribution | Splitting of air current | D J Deshmukh UMS Vol-I | |
| 16 | | | 08 | Air Crossing & Distribution | Numerical problems on splitting | D J Deshmukh UMS Vol-I | |
| 17 | | | 09 | Air Crossing & Distribution | Air locks at pit top. | D J Deshmukh UMS Vol-I | |
| 18 | | V | 10 | Air Crossing & Distribution | Unit Test-II Revision | | |
| 19 | | | 01 | Mechanical Ventilation | Construction of centrifugal flow fans | G B Mishra UMS Vol-I | |
| 20 | | | 02 | Mechanical Ventilation | Principle of operation of centrifugal flow fans. | G B Mishra UMS Vol-I | |
| 21 | | | VI | 03 | Mechanical Ventilation | Fan laws & calculation of fan efficiency and capacity | G B Mishra UMS Vol-I |
| 22 | | 04 | | Mechanical Ventilation | Installation of mine fan with reversal arrangement | G B Mishra UMS Vol-I | |
| | | III | | | | | |

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| 23 | | VII | 05 | Mechanical Ventilation | Fan drift, fan drive | G B Mishra UMS Vol-I |
| 24 | | | 06 | Mechanical Ventilation | Evasee and diffusers | G B Mishra UMS Vol-I |
| 25 | | | 07 | Mechanical Ventilation | Fan characteristics and mine characteristics | G B Mishra UMS Vol-I |
| 26 | | | 08 | Mechanical Ventilation | Methods of output of mine fans | G B Mishra UMS Vol-I |
| 27 | | | 09 | Mechanical Ventilation | Unit Test-III Revision | |
| 28 | | | 01 | Booster Fan & its Effect | Installation of Booster Fan | L C Kaku G B Mishra UMS Vol-I |
| 29 | | VIII | 02 | Booster Fan & its Effect | Installation of Booster Fan | L C Kaku G B Mishra UMS Vol-I |
| 30 | | | 03 | Booster Fan & its Effect | Location of Booster Fan | L C Kaku G B Mishra UMS Vol-I |
| 31 | | | 04 | Booster Fan & its Effect | Purpose of Booster Fan | L C Kaku G B Mishra UMS Vol-I |
| 32 | | | 05 | Booster Fan & its Effect | Effect of Booster fan | L C Kaku G B Mishra UMS Vol-I |
| 33 | IX | | 06 | Booster Fan & its Effect | Problems related to booster fan | L C Kaku G B Mishra UMS Vol-I |
| 34 | | 07 | Booster Fan & its Effect | Problems related to booster fan | L C Kaku G B Mishra UMS Vol-I | |
| 35 | | 08 | Booster Fan & its Effect | Problems related to booster fan | L C Kaku G B Mishra UMS Vol-I | |
| 36 | | 09 | Booster Fan & its Effect | Unit Test-IV | | |
| 37 | IV | X | 10 | Booster Fan & its Effect | Revision | |
| 38 | | | V | 01 | Auxiliary Ventilation | Systems of Auxiliary Ventilation |

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| 39 | | | 02 | Auxiliary Ventilation | Systems of Auxiliary Ventilation | G B Mishra D J Deshmukh |
| 40 | | | 03 | Auxiliary Ventilation | Systems of Auxiliary Ventilation | G B Mishra D J Deshmukh |
| 41 | | | 04 | Auxiliary Ventilation | Advantages of Auxiliary Ventilation | G B Mishra D J Deshmukh |
| 42 | | XI | 05 | Auxiliary Ventilation | Disadvantages of Auxiliary Ventilation | G B Mishra D J Deshmukh |
| 43 | | | 06 | Auxiliary Ventilation | Unit Test-V | |
| 44 | | | 07 | Auxiliary Ventilation | Revision | |
| 45 | | | XII | 01 | Ventilation Survey | Pressure Survey using differential barometer |
| 46 | 02 | Ventilation Survey | | Pressure Survey using gauge & pitot tube with manometer | G B Mishra UMS Vol-I | |
| 47 | 03 | Ventilation Survey | | Method of measurement of cross-sectional area | G B Mishra UMS Vol-I | |
| 48 | 04 | Ventilation Survey | | Method of measurement of cross-sectional area | G B Mishra UMS Vol-I | |
| 49 | VI | XIII | 05 | Ventilation Survey | Velocity measurement by using anemometer, voltmeter | G B Mishra UMS Vol-I |
| 50 | | | 06 | Ventilation Survey | Velocity measurement by pitot-static tube | G B Mishra UMS Vol-I |
| 51 | | | 07 | Ventilation Survey | Velocity measurement by smoke & cloud method | G B Mishra UMS Vol-I |
| 52 | | | 08 | Ventilation Survey | Determination % of Oxygen, Methane, CO, SO ₂ & H ₂ S | G B Mishra UMS Vol-I |
| 53 | XIV | 09 | Ventilation Survey | Unit Test-VI | | |
| 54 | | 10 | Ventilation Survey | Revision | | |

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| 55 | VII | | 01 | Leakage of Air in Mines | Causes of Leakage of Air in mines | G B Mishra UMS Vol-I |
| 56 | | | 02 | Leakage of Air in Mines | Causes of Leakage of Air in mines | G B Mishra UMS Vol-I |
| 57 | | XV | 03 | Leakage of Air in Mines | Preventive measures of Leakage of Air in mines | G B Mishra UMS Vol-I |
| 58 | | | 04 | Leakage of Air in Mines | Preventive Measures of Leakage of Air in mines | G B Mishra UMS Vol-I |
| 59 | | | 05 | Leakage of Air in Mines | Unit Test-VII | |
| 60 | | | 06 | Leakage of Air in Mines | Revision | |

Signature of

Faculty Member

HOD

Principal/ Director