IIPM SCHOOL OF ENGINEERING & TECHNOLOGY

**LESSON PLAN: 2020-21**

Sub: Th.3- Mine Ventilation (MV)

# Branch : Mining

**Faculty name** **:** **Soumya Ranjan Dash**

# Semester : 4th

**Duration** **:** **60 hours**

# Objective :

* Describe different instruments measuring temperature, pressure and humidity and have idea on natural ventilation and laws of mine air friction.
* Describe different types of ventilation and methods of air crossings and distribution.
* Illustrate different types of fans, fan characteristics, Mine characteristics and selection of fans.
* Identify different locations of booster fan and solve simple problems relating to this.
* Explain different systems of auxiliary ventilation and its advantages and disadvantages.
* Explain different ways of pressure survey, quantity survey & quality survey.
* 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 |
| **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 | Homotropal & Antitropal ventilation. | **D J Deshmukh UMS Vol-I** |
| **13** | **IV** | **05** | Air Crossing & Distribution | Boundary ventilation | **D J Deshmukh UMS Vol-I** |
| **14** | **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** | **V** | **09** | Air Crossing & Distribution | Air locks at pit top. | **D J Deshmukh UMS Vol-I** |
| **18** | **10** | Air Crossing & Distribution | Unit Test-II Revision |  |
| **19** | **III** | **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** |
| **23** | **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** | **VII** | **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** | **IV** | **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** | **X** | **10** | Booster Fan & its Effect | Revision |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **38** | **V** |  | **01** | Auxiliary Ventilation | Systems of Auxiliary Ventilation | **G B Mishra****D J Deshmukh** |
| **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** | **XI** | **04** | Auxiliary Ventilation | Advantages of Auxiliary Ventilation | **G B Mishra****D J Deshmukh** |
| **42** | **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** | **VI** | **XII** | **01** | Ventilation Survey | Pressure Survey using differential barometer | **G B Mishra UMS Vol-I** |
| **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** | **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, SO2 & H2S | **G B Mishra UMS Vol-I** |
| **53** | **XIV** | **09** | Ventilation Survey | Unit Test-VI |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **54** |  |  | **10** | Ventilation Survey | Revision |  |
| **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 |  |

**Books Suggested:**

* + Mine Ventilation G B Mishra
	+ EMT II
	+ Mine Ventilation

D J Deshmukh L C KAKU

Signature of

# Faculty Member HOD Principal/ Director