



# IIPM SCHOOL OF ENGINEERING & TECHNOLOGY

## LESSON PLAN: 2022-23

### Sub: Th.2- Mine Hazard and Safety (MHS)

Branch	:	Mining	Semester	: 5TH
Faculty name	:	Soumya Ranjan Dash		
Duration	:	60 hours		

#### SYLLABUS

UNIT I	<p><b>1. MINE GASES &amp; GAS TESTING</b></p> <ul style="list-style-type: none"> <li>➤ Composition of atmospheric air. Different mine gases, their properties and physical effects .</li> <li>➤ State fire damps, black damp, stink damp, white damp and after damp in mines.</li> <li>➤ Describe flame safety lamp &amp; its working principle.</li> <li>➤ Explain gas testing by flame safety lamp by accumulation test &amp; percentage test.</li> <li>➤ State precaution for gas testing.</li> <li>➤ Describe various parts of flame safety lamp, special features.</li> <li>➤ State limitations of flame safety lamp.</li> </ul>
UNIT II	<p><b>2. EMISSION OF FIREDAMP IN U/G WORKINGS</b></p> <ul style="list-style-type: none"> <li>➤ Describe gradual exudation, blower &amp; outbursts of firedamp in U/g workings.</li> </ul>
UNIT III	<p><b>3. DEFINE FIRES &amp; SPONTANEOUS HEATING</b></p> <ul style="list-style-type: none"> <li>➤ Define incubation period</li> <li>➤ Define spontaneous heating and its causes and effects.</li> <li>➤ State preventive measures against spontaneous heating.</li> <li>➤ Explain CO/O<sub>2</sub> ratio &amp; CO<sub>2</sub>/O<sub>2</sub> ratio.</li> </ul>
UNIT IV	<p><b>4. MINE EXPLOSION</b></p> <ul style="list-style-type: none"> <li>➤ Describe coal dust explosion &amp; fire damp explosion with their causes &amp; prevention.</li> <li>➤ State inflammability of coal dust &amp; fire damp.</li> <li>➤ Explain Coward's diagram.</li> <li>➤ State prevention, suppression &amp; treatment of dust.</li> <li>➤ Describe sampling of dust in Mines.</li> <li>➤ Stone dust barrier.</li> </ul>
UNIT V	<p><b>5. MINE INUNDATION</b></p> <ul style="list-style-type: none"> <li>➤ State sources of water in mines &amp; its danger.</li> <li>➤ State precaution against inundation.</li> <li>➤ Describe burnside safety boring apparatus.</li> <li>➤ State precaution while approaching water logged area.</li> <li>➤ Describe water dams- its construction &amp; design. (Without derivation of formula)</li> <li>➤ Explain water danger plan.</li> <li>➤ Statutory provision for working near water body.</li> </ul>
UNIT VI	<p><b>6. MINE LIGHTING &amp; ILLUMINATION</b></p> <ul style="list-style-type: none"> <li>➤ Define illumination and its units.</li> <li>➤ Standards of lighting at different parts of mine as per mine regulation.</li> </ul>

<b>UNIT VII</b>	<b>7. NOISE AND VIBRATION .</b> ➤ Explain the effect of noise & vibration on miners & mine structures & other surface structure with respect to statutory provision.
<b>UNIT VIII</b>	<b>8. MINE RESCUE AND RECOVERY</b> ➤ Proto-IV, Proto-V, Drager BG-174, Self rescuer, Smoke helmet, Gas mask. ➤ Construction of Rescue brigade and their role in rescue and recovery operation. ➤ Mine Rescue rules 1985 Annexure I,II,III.

### Books Suggested:

- Mine Ventilation G B Mishra
- Mine Rescue M A Ramlu

### Objective :

- Testing of different mine gases. Physiological effect on miners, detection of fire damp by flame safety lamp, explains the method of gas testing by CO-detectors & methanometer.
- Explain how firedamp is emitted in mines.
- Explain causes of mine fires & spontaneous heating.
- Define explosion, explain causes & elaborate necessary steps required for prevention of coal dust & firedamp explosion.
- Define mine inundation, explain causes & elaborate necessary preventive measures required.
- Describe lighting arrangement, lighting standards explain glare & its effect
- Explain the effect of noise & vibration on miners & mine structures & other surface structure.
- Explain rescue and recovery work when mine hazard occurs.

**Learning Outcome:** As a Mining Engineer, one must be thoroughly conversant with various sources of mining hazards as also the remedial measures needed to be undertaken to avoid any mishap and able to understand total operation of rescue and recovery.

Sl. No	Chapter	Proposed Week for Teaching	Lecture No.	Sub. Topic	Important Teaching Points	Content Source
01	I	1 <sup>ST</sup>	01	Mine gases & gas testing	Different Hazards in Mines and summary of general safety measures in underground mine	G B Mishra M A Ramlu
02			02	Mine gases & gas testing	Mine atmosphere, Properties & Physical effects different type of Mine Gases	G B Mishra M A Ramlu
03			03	Mine gases & gas testing	Fire damp, black damp, stink damp, white damp & after damp	G B Mishra M A Ramlu

04			04	Mine gases & gas testing	Working principle of Flame Safety lamp	G B Mishra M A Ramlu
05		2 <sup>ND</sup>	01	Mine gases & gas testing	Accumulation & percentage test by Flame safety lamp	G B Mishra M A Ramlu
06			02	Mine gases & gas testing	Precaution for gas testing	G B Mishra M A Ramlu
07			03	Mine gases & gas testing	Various parts of Flame safety lamp	G B Mishra M A Ramlu
08			04	Mine gases & gas testing	Limitation of Flame safety lamp	G B Mishra M A Ramlu
09	<b>II</b>			01	Emission of firedamp in U/g workings	Gradual exudation, blower and outbursts of firedamp in underground mine
10		3 <sup>RD</sup>	02	Mine gases & gas testing and Emission of firedamp in U/g workings	Revision Class and Group discussion (Chapter 1&2)	-----
11	<b>I &amp; II</b>		03	Mine gases & gas testing and Emission of firedamp in U/g workings	Unit Test I-II	-----
12			04	Mine gases & gas testing and Emission of firedamp in U/g workings	Doubt Clearing Class (Chapter 1&2)	-----
13				01	Mine fires & spontaneous heating	Formation of Fire, triangle of fire
14		4 <sup>TH</sup>	02	Mine fires & spontaneous heating	Incubation period	G B Mishra M A Ramlu
15			03	Mine fires & spontaneous heating	Spontaneous heating and its causes	G B Mishra M A Ramlu
16	<b>III</b>		04	Mine fires & spontaneous heating	Effects of spontaneous heating	G B Mishra M A Ramlu
17				01	Mine fires & spontaneous heating	Preventive measures against spontaneous heating
18		5 <sup>TH</sup>	02	Mine fires & spontaneous heating	CO/O <sub>2</sub> ratio	G B Mishra M A Ramlu
19			03	Mine fires & spontaneous heating	CO <sub>2</sub> /O <sub>2</sub> ratio	G B Mishra M A Ramlu
20			04	Mine fires & spontaneous heating	Revision Class and Group discussion (Chapter 3)	-----

21	IV	6 <sup>TH</sup>	01	Mine fires & spontaneous heating	Unit Test- III	-----
22			02	Mine fires & spontaneous heating	Doubt Clearing Class (Chapter 3)	-----
23			03	Mine Explosion	Coal dust explosion, causes & prevention	G B Mishra M A Ramlu
24			04	Mine Explosion	Fire damp explosion, causes & prevention	G B Mishra M A Ramlu
25		7 <sup>TH</sup>	01	Mine Explosion	Inflammability of coal dust & fire damp	G B Mishra M A Ramlu
26			02	Mine Explosion	Coward's diagram	G B Mishra M A Ramlu
27			03	Mine Explosion	Prevention, suppression & treatment of dust	G B Mishra M A Ramlu
28			04	Mine Explosion	Sampling of dust	G B Mishra M A Ramlu
29		8 <sup>TH</sup>	01	Mine Explosion	Stone dust barrier	G B Mishra M A Ramlu
30			02	Mine Explosion	Revision Class and Group discussion (Chapter 4)	-----
31			03	Mine Explosion	Unit Test- IV	-----
32			04	Mine Explosion	Doubt Clearing Class (Chapter 4)	-----
33	V	9 <sup>TH</sup>	01	Mine Inundation	Surface water sources & Underground water sources in mines and its danger	G B Mishra M A Ramlu
34			02	Mine Inundation	Precaution against Inundation	G B Mishra M A Ramlu
35			03	Mine Inundation	Burnside safety boring apparatus. VOLSAFE-500	G B Mishra M A Ramlu
36			04	Mine Inundation	Precaution while approaching water logged area and provision for working near water body.	G B Mishra M A Ramlu
37		10 <sup>TH</sup>	01	Mine Inundation	Water dams- its construction & design and water danger plan.	G B Mishra M A Ramlu
38			02	Mine Inundation	Revision Class and Group discussion (Chapter 5)	-----
39			03	Mine Inundation	Unit Test- V	-----

40			04	Mine Inundation	Doubt Clearing Class (Chapter 5)	-----
41	<b>VI</b>	11 <sup>TH</sup>	01	Mine lighting & Illumination	Illumination and its units.	G B Mishra M A Ramlu
42			02	Mine lighting & Illumination	Intensity of light, Luminous efficiency, Reflection, MHCP, MSCP	G B Mishra M A Ramlu
43			03	Mine lighting & Illumination	Lighting in Mines (On surface & bellow ground)	G B Mishra M A Ramlu
44			04	Mine lighting & Illumination	Standard of lighting according to DGMS circular	G B Mishra M A Ramlu
45	<b>VII</b>	12 <sup>TH</sup>	01	Noises & Vibration	Sources of noise	G B Mishra M A Ramlu
46			02	Noises & Vibration	Vibration effect	G B Mishra M A Ramlu
47			03	Noises & Vibration	effect of noise & vibration on miners & mine structures	G B Mishra M A Ramlu
48	<b>VI &amp; VII</b>	13 <sup>TH</sup>	04	Mine lighting & Illumination and Noises & Vibration	Revision Class and Group discussion (Chapter 6-7)	-----
49			01	Mine lighting & Illumination and Noises & Vibration	Unit Test- VI & VII	-----
50			02	Mine lighting & Illumination and Noises & Vibration	Doubt Clearing Class (Chapter 6-7)	-----
51	<b>VII</b>	14 <sup>TH</sup>	03	Mine Rescue and Recovery	Proto-IV	G B Mishra M A Ramlu
52			04	Mine Rescue and Recovery	Proto-V	G B Mishra M A Ramlu
53			01	Mine Rescue and Recovery	Drager BG-174, special features of the Drager BG-174	G B Mishra M A Ramlu
54			02	Mine Rescue and Recovery	Self rescuer, Smoke helmet, Gas mask	G B Mishra M A Ramlu
55			03	Mine Rescue and Recovery	Construction of Rescue brigade and their role in rescue and recovery operation	G B Mishra M A Ramlu
56			04	Mine Rescue and Recovery	Mine Rescue rules 1985	DGMS
57			15 <sup>TH</sup>	01	Mine Rescue and Recovery	Mine Rescue rules 1985 Continue.

58			02	Mine Rescue and Recovery	Revision Class and Group discussion (Chapter 8)	-----
59			03	Mine Rescue and Recovery	Unit Test- VIII	-----
60			04	Mine Rescue and Recovery	Doubt Clearing Class (Chapter 8)	-----

Signature of

**Faculty Member**

**HOD**

**Principal/ Director**