

**Curriculum
For
Certificate in Health & Safety Management in Mines
(Certificate Level - 6 months)
Code:VE42S001
(2013)**

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Introduction

Pakistan has been endowed with sizable mineral resources including coal, iron, copper, gold, silver, lime stone, dolomite, granite, marble, salt, china-clay, gypsum, gem stones being exploited both by surface and underground mining.

Mining is a dynamic industry. Immediately after excavation of rocks whether by explosives or machines, the rock stability is disturbed. In underground mining the confined space possess many challenges to mine safety, hazard control as well as rescue operations. Major challenges in underground mines relate to mine ventilation, strata control and support, ingress of water and gases, generation of noise, increase of humidity and temperatures. Sometimes incidents of mine fires, spontaneous heating, gas and dust explosions and un-alarmed collapse of roof and ribs. The persons employed in surface mining are exposed to hazards caused by slipping of sides, contingent risks caused by explosives and machine operations.

The accidents are not caused in mines but happen due to human errors, lack of awareness of mine safety and in-attention to potential risks. The safety of persons in mines is always at jeopardy owing to ever changing conditions in mines as opposed to general conditions of the industry. Extrication of trapped persons in mines is the foremost task of rescue and recovery and can be handled only with thorough knowledge and safety management. In view of the potential risks in mine operations, the health of persons at work station is impaired. The degree of health loss is a function of risk level in mines. This risk leads to occupational diseases which need to be addressed and measures taken.

Mining being arduous is full of physical fatigue, challenges for ergonomics. The higher the fatigue lower will be the judgment level and more chances of mine accidents.

This curriculum focuses on the following safety measures in order to avoid accidents, harmful effects of gases and diseases arising from mining activities.

- Slope Stability Control
- Roof Fall Control
- Gases detection and control

- Mine Inundation Prevention
- Heat Control and Fire prevention
- Safe use of machinery and equipment
- Organized Training on
 1. Identification of mine environment
 2. Evaluation of risk and adoption of remedial measures
 3. Rescue and Recovery
- Workplace Activities

Overall objectives of course:

1. To ensure safety of the mines and persons.
2. Evaluation of mine environment as per checklist
3. Assessment of potential dangers in mines.
4. Remedial measures
5. Dealing with mine emergencies
 1. Organizing rescue team
 2. Planning to reach the place of accident
 3. Co-ordination with rescue teams
 4. Recovery of affectees
6. Ensure provision of protective measures against potential dangers likely to be caused by machinery and equipment.
7. To perform effective communication (hand signals or two-way radio/electronic communication)
8. To provide guidance in setting up educational framework within which preventive and remedial measures can be implemented.

9. To display hazard related dangerous signs to mining activities.

Competencies gained after completion of course:

1. Awareness on enhanced safety and productivity
2. Conduct risk assessment
3. Monitor safe workplace
4. Apply occupational health and safety plan
5. Manage mining backup services
6. Perform communication
7. Conduct safe blasting conduct of mining operations safely
8. Safe storage, handling, use and transportation of all materials used in mining
9. Use and maintain fire extinguishers
10. Use and maintain various gas detectors
11. Use and maintain Personnel Protective Equipment (PPE)
12. Use of appropriate hand signals and two-way radio/electronic communication
13. Proper display of dangerous signs before accident and after accident.

Current and Future Job Opportunities

The successful trainees may have numerous existing and future job opportunities in following areas/fields:

- Pakistan Mineral Development Corporation (PMDC)
- Pakistan Atomic Energy Commission
- Pakistan Kashmir Mineral Resources, AJK
- Punjab Mineral Development Corporation (PUNJMIN)
- Azad Kashmir Mineral and Industrial Development Corporation
- Sindh Coal Authority
- Balochistan Development Authority
- Lakhra Coal Development Company Limited
- Pakistan Stone Development Company (PASDEC)
- Saindak Copper Gold Project Balochistan
- Hazara Phosphate Mines
- Pakistan American Fertilizer Factory, Iskandarabad
- Cement factories
- Mineral exploration companies
- Thar coal project
- Reko-Diq copper/gold project

- Salt mines
- Chinaclay mines
- All Private sector Mining Companies

Trainee Entry Level Requirements

Middle/Matriculation

Minimum Qualification of Teacher/Trainer

3 years Diploma of Associate Engineer (DAE) in Mining Technology with minimum 3 years experience in any mine.

OR

Bachelors of Engineering (B.E) in Mining Engineering.

Medium of Instructions

Urdu/English

Sequence of Modules

Trainees must complete Module 1 (Introduction to Mining) first

Overview about the Program –Curriculum for Health and Safety Management in Mines

Module Title and Aim	Learning Units	Theory ¹ Days/hours	Workplace ² Days/hours	Timeframe of modules
Module 1 <i>Introduction to MINING</i>	Unit1 Introduction to Mining Technology Unit 2 Basic terminology used in mining Unit 3Surface mining methods and machinery Unit4 Underground Mining Methods and machinery Unit5 Unit operations of mining Unit6 Auxiliary Operations of Mining	36	24	Complete first
Module 2 <i>Mine hazards</i>	Unit1Causes of mining accidents Unit2 Roof fall Unit3 Mine Gases Unit4 Mine inundation Unit5Use of machinery and equipment Unit6Explosive Unit7Fire Unit8 Ergonomic Unit9Coal Dust	28	144	Complete Module 1 first

¹ Learning hours in training provider premises

² Training workshop, laboratory and on-the-job workplace

Module Title and Aim	Learning Units	Theory³ Days/hours	Workplace⁴ Days/hours	Time frame of modules
Module 3 <i>Mining work place and Safety Initiatives</i>	Unit1 Assessment of mine environment Unit 2 Identification of potential hazards at workplace Unit3 Deal with hazardous conditions Unit4 Traffic Management Unit5 Safe Use of operating equipment Unit6 Safe handling and use of mine material Unit7 Lockout and tagging equipment and energy Unit8 Safety Signs at work Unit9 Signaling and Warning System in Mines	18 hours	144 hours	Complete Module 2 first
Module 4 <i>Mining work place and occupational health hazards</i>	Unit1 Assessment of mine environment relating to health issues Unit 2 Identification of occupational diseases Unit3 Medical Follow up	16 hours	40 hours	Complete Module 3 first
Module 5 <i>Perform Communication</i>	Unit1 Effective communication model Unit2 Person-to-person or interpersonal communication Unit3 Speak clearly and concisely Unit4 Listen actively Unit5 Use two-way radio /electronic communication	20 hours	96 hours	Complete Module 4 first

³ Learning hours in training provider premises

⁴ Training workshop, laboratory and on-the-job workplace

	Unit6 Use appropriate hand signals for job			
Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Time frame of modules
Module 6 <i>Responding to a Mine Emergency</i>	Unit1 Initiate an Emergency Mine Evacuation plan Unit2 Contact Emergency Personnel Unit3 Help in Organizing establishment of Command Center Unit4 Functions of Command Center Unit5 First-Aid	18 hours	112 hours	Complete Module 5 first
Module Title and Aim	Learning Units	Theory Days/hours	Workplace Days/hours	Time frame of modules
Module 7 <i>Skills development</i>	Unit1 Career Advancement Unit2 Attend Training Programs and workshops Unit3 Consult Seniors Unit4 Read Mining Books Unit5 Explore Internet	24 hours	92 hours	Complete Module 6 first

Health and Safety Management in Mines- Curriculum Contents (Teaching and Learning Guide)

Module 1: Introduction to Mining

Objective of the Module 1: This module provides a general introduction to different mining methods using various kinds of mining machinery and applying appropriate ventilation, supporting system, ground control, dewatering lighting, communication etc.

Duration: 48 hours (Theory: 40 hours and Practice: 8hours)

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
1. Introduction to Mining Technology	Able to define extraction of rocks, ores and minerals.	<ul style="list-style-type: none"> - Introduction to mining - Stages in the life of mine: prospecting, exploration, development, exploitation. 	8 hours	Lecture notes	Classroom
2. Basic terminology used in mining	Able to define terms used in surface and underground mining	<ul style="list-style-type: none"> - Definitions and explanation of technical terms, i.e. Tunnel, Adit, Levels, Raize, Winze, Shaft, Incline, Cross cut, Seam, Vein, Bed, Strike, True dip, Apparent dip, Fault, Rock, Mineral, Ore, Mine, Miner, Pit, Out crop, Floor, Hanging wall, Foot wall, Marken bed, Prop, Sump, Burden, Damp, Quarry, slop, ramp, berm etc 	16 hours	Lecture notes and Images related to each technical term	Classroom and workplace

3. Surface mining methods and machinery	Able to explain extraction of minerals in open atmosphere and use of mine machinery	<ul style="list-style-type: none"> - Methods of surface mining - Open-pit, Strip mining, mountain top removal and quarrying methods - Dragline excavator - Bucket Wheel Excavator - Dumpers 	8 hours	Lecture notes of Surface Mining method and related Videos	Classroom
4. Underground Mining Methods and machinery	Able to explain extraction of minerals underground and use of machinery	<ul style="list-style-type: none"> - Underground mining methods. - Room and Pillar, Long wall, Short wall - Continuous miner, - Shuttle Car - Armored Face Conveyor 	8 hours	Lecture notes of Underground Mining methods and related Videos	Classroom
5. Unit operations of mining	Able to explain Drilling, Blasting, Loading, Hauling, Supporting	<ul style="list-style-type: none"> - Sequence of unit operations - Introduction to drilling, blasting, loading, and transportation and supporting system 	4 hours	Lecture notes of Unit operations of mining and related Videos	Classroom
6. Auxiliary Operations of Mining	Able to recognize those activities which are essential to maintain safe and productive operating conditions.	<ul style="list-style-type: none"> - Ground control, ventilation, de-watering, power supply, lighting, communication. 	4 hours	Lecture notes of Auxiliary operations of mining and related Videos	Classroom

Module 2: Mine hazards

Objective of the Module 2: This module provides a complete knowledge about mine hazards which can cause fatalities or injuries to mine workers. Technologies to prevent accidents should be implemented during mine work in order to safeguard mine workers from any occupational injury or disease. Mine machinery needs to be handled with great care.

Duration: 182 hours (Theory: 18 hours and Practice: 164 hours)

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
1. Causes of mining accidents	Able to explain occupational injuries to the workers as a result of mining work and occurrence of any unplanned event at any mine that has the potential to cause an injury or disease to persons at work.	<ul style="list-style-type: none"> -Collapse of the working face -roof fall -Inrush of water into mine -The unintentional ignition or detonation of explosives, -Leakage of noxious gases from goaf area Coal dust explosion. 	20 hours	Lecture notes and already prepared report of mine accidents and warning signs	Classroom and workplace
2. Roof fall	Able to explain natural and roof and rib control, assessment of roof stability and causes of periodic and major roof fall. Able to explain natural sources and mining related sources of roof fall hazards.	<ul style="list-style-type: none"> - Roof Supporting System - Roof Control Plan - Natural Sources of roof fall Hazards - Roof fall risk-assessment methods. - Geological hazards like faults, slips, joints, weak or brittle rock. - Installation of roof bolts for roof stability or supplemental Roof Support: steel wire mesh 	20 hours	Lecture notes, audio/visuals and warning signs related to roof fall	Classroom and workplace

3. Mine Gases	Able to explain mine ventilation, mine gases and maximum allowable concentration (MAC) in underground environment, effects of hazardous gases on health of the miners.	<ul style="list-style-type: none"> - Mine Ventilation - Ventilation leakage - Carbon dioxide - Carbon Monoxide - Hydrogen sulfide - Methane - Sulfur dioxide - MAC of gases - 	20 hours	Lecture notes and handouts and warning signs	Classroom and workplace
4. Mine Inundation	Able to explain technologies of preventing mine water hazards, exploration of hydrological conditions; prediction and forecast of water inrush; mining under safe water pressure ; and sealing of ground water by grouting.	<ul style="list-style-type: none"> - Surface and Ground water - Types of aquifers - Porosity and Permeability - Water table - Hydrological cycle - Hydrological conditions of the mine area. - Mine inundation and classification - Technologies to prevent Mine inundation hazard. - De-watering design 	20 hours	Lecture notes, handouts, related Videos and warning signs	Classroom and workplace
5. Use of machinery and equipment	Able to understand safe operation of mining machinery and equipment.	<ul style="list-style-type: none"> - Safe work around moving machinery - Safe Handling of sharp tools - Machine guarding 	20 hours	Lecture Notice, machinery/ equipment manuals and warning signs	Classroom and workplace
6. Explosive	Able to handle	<ul style="list-style-type: none"> - Explosives 	20 hours	Lecture Notes,	Classroom and

	explosives and blasting accessories safely.	<ul style="list-style-type: none"> - Detonators - Explosive handling - Explosive storage - Dangerous signs - Evacuation before blasting 		Explosive Material Safety Datasheets (MSDS) and warning signs	workplace
7. Fire	Able to understand sources of fire in mines. Fire-fighting methods. Proper use of fire extinguishers.	<ul style="list-style-type: none"> - Causes of Fire - Safety precautions to prevent fire - Fire-fighting methods - Types of extinguishers - Dealing with coal and oil fires. 	22 hours	Lecture Notes, portable extinguisher manual and warning signs	Classroom
8. Ergonomic hazards	Able to recognize Ergonomic hazards which are common in mining, as miners generally handle heavy equipment and do heavy work, often in confined conditions.	<ul style="list-style-type: none"> - Introduction to ergonomic hazard - Risk Factor: forceful work, poor posture, repetitive work, vibration exposure etc. - Environmental factors: temperature, humidity - Root cause: effort, speed of work, duration of task, productivity level. - Work-related injuries/diseases. - Prevention - 	20 hours	Lecture Notes and ergonomic related warning signs	Classroom and workplace
9. Coal Dust	Able to understand the potential hazards caused by pulmonary dust	<ul style="list-style-type: none"> - The remedial measures for dust suppression will lead to safe and healthy environment 	20 hours	Lecture Notes	Classroom and workplace

Module 3: Mining Workplace and Safety Initiatives

Objective of the Module 3: This module covers the applied knowledge of understanding the work stations(including the access passages) where workers oftenly deal with hazardeous or potentially hazardeous conditions. Safety signs, alarms and signals are also used in mines to warn miners about mine hazard or other emergency.

Duration: 171 hours (Theory: 27 hours and Practice: 144 hours)

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
1. Assessment of mine environments	Able to make assessment the mine environment and record observations as per checklist	<ul style="list-style-type: none">- Compare the checklist with the threshold limits and highlight the areas which are in dangerous zone	19 hours	Lecture Notes	Class and workplace
2. Identification of potential hazards at workplace	Able to identify possibility of hazards of each work place by inspection and report all hazards or potentially hazardous conditions to appropriate authority for remedial measures for accident prevention	<ul style="list-style-type: none">- Inspection of working places of surface mine or underground mines for assessment of imminent danger of:- Dust, mine gases, strata security on use of machinery and equipment, mine ventilation, use of explosives, transportation of men and materials, mine inundation and mine fires.	19 hours	Lecture Notes	Class and workplace

3. Deal with hazardous conditions	Able to deal with hazards conditions and implementation of safety measures.	<ul style="list-style-type: none"> - To ensure the identified hazards to bring them to threshold limits - Dust, mine gases, strata security on use of machinery and equipment, mine ventilation, use of explosives, transportation of men and materials, mine inundation and mine fires. - Placement of signs/labels after identification hazardous locations - Guard all identified hazards using barriers or signs. 	19 hours	Lecture Notes and hazard related warning signs	Class and workplace
4. Traffic Management	Able to control the flow of traffic with least blockage.	<ul style="list-style-type: none"> - Traffic Management control Plan - Design and Layout of road Systems highlighting entry and exit points by displaying with clear sign boards 	19 hours	Lecture Notes and traffic related signboards	Class and workplace
5. Safe Use of operating equipment	Able to handle operating equipment safely and guard	<ul style="list-style-type: none"> - Inspection before working with moving equipment. 	19 hours	Lecture Notes and related signs or labels	Class and workplace

	operating parts of machine.	<ul style="list-style-type: none"> - Hazard identification - Hazard prevention - Obey safety signs, warning signals, lights and controls. - cautiousness around moving equipment - Use and respond to audible signals. 			
6. Safe handling and use of mine materials	Able to understand safe handling and transportation of mine materials	<ul style="list-style-type: none"> - Use of Personnel Protective equipment (PPE) - Safe Location of trouble shooter - Selection of right force/ method of pulling or pushing 	19 hours	Lecture Notes and object for carrying and lifting	Class and workplace
7. Lockout and tagging equipment and energy	Able to recognize the proper control of equipment and energy sources in order to prevent workers from harmful effects of hazardous energy.	<ul style="list-style-type: none"> - Lockout and tagging - Forms of energy - Lockout and Tagging procedure - Planning steps 	19 hours	Lecture Notes and Lockout and Tagging devices: Scissors, Chains, Blocks or Cribbing, Pins and clamps	Class and workplace
8. Safety Signs at work	Able to recognize methods of communicating safety information at work through signs or signboard or labels or Pictograms	<ul style="list-style-type: none"> - Mining Signs - Safety signs - Prohibition sign - Warning sign - Mandatory sign - Emergency escape or first-aid sign - Emergency exit/escape 	19 hours	Lecture Notes and Lockout and Tagging devices: Scissors, Chains, Blocks or Cribbing, Pins and clamps	Class and workplace

		<ul style="list-style-type: none"> - route signs - Firefighting signs 			
9. Signaling and Warning System in Mines	Able to explain signaling and warning system such as audible or visual alarms, telephones and messengers to warn miners fire hazard or other emergency.	<ul style="list-style-type: none"> - Signaling and warning system - Alarms and signals: horn, bells, sirens, whistles, buzzers, fire alarms. 	19 hours	Lecture Notes and Alarms and signals: horns, bells, sirens, whistles, buzzers, fire alarms.	Class and workplace

Module 4: Mining Workplace and occupational health hazard

Objective of the Module 4: This module covers the applied knowledge of understanding the work stations (including the access passages) where workers oftenly contract occupational diseases and remedial measuers.

Duration: 52 hours (Theory: 20 hours and Practice: 32 hours)

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
1. Assessment of mine environments relating to health issues	Able to make assessment of the mine environment on health issues and record observations as per checklist	<ul style="list-style-type: none"> - Compare the checklist with the threshold limits and highlight the areas on health issues which are in dangerous zone 	16	Lecture Notes	Class and workplace
2. Identification of occupational diseases and possibility of	Able to identify possibility of	<ul style="list-style-type: none"> - Inspection of working places of surface mine or underground mines 	12	Lecture Notes	Class and workplace

being contracted by the mine workers	occupational diseases which possibly can impair the health of the work persons.	for assessment of health hazards with regards to occupational diseases only			
3. Medical Follow up	Able to report the suspected persons to an identified medical care center through the mine management	- The health hazards will be reduced and employees will enjoy good health through periodical medical checkup including special medical checkup	20 hours	Lecture Notes and hazard related warning signs	Class and workplace

Module 5: Perform Communication

Objective of the Module 5: This module provides the knowledge of interpersonal communication skills and internationally established code of signals to be adopted and applied for minimizing mine risks.

Duration: 101 hours (Theory: 11 hours and Practice: 90 hours)

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
1. Effective communication model	Able to understand the importance of communication and feedback. Identify the communication barriers	- Clarity of message and ensuring what has been conveyed and displayed the real message behind - Remove communication barriers	15 hours	Lecture Notes	Classroom and workplace
2. Person-to-person or interpersonal	Able to understand direct, face-to-face	- Clarity of message will lead to the correct and	24 hours	Lecture Notes	Classroom and workplace

communication	and clarification of meaning. It helps to ensure mutual understanding.	desired signal to avoid noise (unwanted message)			
3. Speak clear and concise	Able to identify and use common language of usage for job site	<ul style="list-style-type: none"> - Common language - Speaking Skills - Be specific and concise - Work place specific vocabulary and gestures 	16 hours	Lecture Notes	Classroom and workplace
4. Listen actively	Able to understand instructions and attention to messages	<ul style="list-style-type: none"> - Listening Skills - Removal of inattention to message, signal or code - Make passive listener as active listener 	16 hours	Lecture Notes	Classroom and workplace
5. Use two-way radio /electronic communication	Able to understand the importance of two-way communication for communicating sensitive issues or information regarding any hazard	<ul style="list-style-type: none"> - Two-way communication provides simultaneous speaking and listening for refined clear message leading to minimizing mine risk 	16 hours	Lecture Notes and two-way radio/electronic communication system.	Classroom and workplace
6. Use appropriate hand signals for job	Able to use body language/ hand signals for various actions at work	<ul style="list-style-type: none"> - Hand signals - Visual Contact - Conformation of hand signals 	14 hours	Lecture Notes	Classroom and workplace

Module 6: Responding to a Mine Emergency

Objective of the Module 6: This module provides expertises to deal with emergencies such as self-slipping of rocks, mine fires, dust and gas explosions, and obnoxious gases, water inundation which require prompt action and efficient management of emergency operations.

Duration: 130 hours (Theory: 20 hours and Practice: 110 hours)

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
1. Initiate an Emergency Mine Evacuation plan	Able to initiate an immediate mine evacuation plan in the event of a mine emergency.	<ul style="list-style-type: none"> - Emergency Evacuation Warning Systems - Escape ways - Evacuation Plans - Evacuation Procedures - Mine environment monitoring Systems 	26 hours	Lecture notes and Mine maps, Ventilation plan, Emergency warning system, Emergency Signs	Classroom and Workplace
2. Contact Emergency Personnel	Able to organize the contact to all emergency personnel	<ul style="list-style-type: none"> - Local Coordination: security, medical assistance, logistics, traffic control, supplies and the layout of surface facilities. 	26 hours	Lecture notes, Mine emergency notification plan and notification list, and Communication system	Workplace
3. Help in Organizing establishment of Command Center	Able to organize/establish a command center that is essential and integral part of a mine emergency command system.	<ul style="list-style-type: none"> - One of the key resource person for the establishment, control and management of command center 	26 hours	Lecture notes, communication system, mine and ventilation maps, escape ways maps.	Workplace
4. Functions of Command Center	Able to understand the functioning of command center in flow of	<ul style="list-style-type: none"> - Timely assistant and coordination with all pillars of command center including the 	26	Lecture notes, Mine emergency notification plan and notification	

	communication, traffic, mobilization of men and materials, coordination with media and other stakeholders about the rescue and recovery measures	mine management will help in minimizing pain and agony and will repose confidence of workers in the mining profession.		list, and Communication system	Workplace
5. First-Aid	Able to provide first-aid facilities, services and personnel required for the initial treatment of persons suffering from injury or illness at a workplace.	<ul style="list-style-type: none"> - First-Aid - Aims of First-Aid - First-aid facilities - Contents of First-Aid Box - Responding to Life-Threatening Emergencies - Responding to Non-Life-Threatening Emergencies 	26 hours	Lecture Notice, First-Aid box and Kit	Classroom and Workplace

Module 7: Skills Development

Objective of the Module 7: This module suggests the skills development of the workers working in mining industry in order to learn and keep himself/herself knowledgeable about the advanced prevention technologies related to mine hazards.

Duration: 116 hours (Theory: 24 hours and Practice: 92 hours)

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
1. Career Advancement	Able to understand the career advancement by learning new skills	<ul style="list-style-type: none"> - Interest in learning new skills - Importance of learning new skills 	16 hours	Lecture Notes	Classroom
2. Attend Training Programs and workshops	Able to get more practical information regarding mine hazards and advanced methods of prevention.	<ul style="list-style-type: none"> - Personal safety awareness - Key processes in skills development - Various training Programs 	40 hours	Lecture Notes and training manuals	Classroom and Workplace
3. Consult Seniors	Able to learn by interaction and from seniors.	<ul style="list-style-type: none"> - Team Work - Sharing practical knowledge - Solution of problems 	16 hours	Lecture Notes	Workplace
4. Read Mining Books	Able to enhance the knowledge of advanced technologies of mining.	<ul style="list-style-type: none"> - Advanced Mining Operations - New Technologies Introduced in Mining - Advanced Mine Machinery - New Mining Companies 	16 hours	Mining Books	Workplace/ library
5. Explore Internet	Able to explore Internet for Personal Skills Development	<ul style="list-style-type: none"> - Introduction to Information Technology 	28 hours	Internet	Workplace/ Computer Lab

		<ul style="list-style-type: none"> - Mining Sites - Downloading Learning Manuals 			
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Assessment

MODULE 1: Introduction to MINING

Learning Units	Theory Days /hours	Work place Days /hours	Recommended formative assessment	Recommended methodology	Scheduled dates
1. Introduction to Mining Technology	8		Trainee will: <ul style="list-style-type: none"> ✓ Explain Stages in the life of mine: prospecting, exploration, development, exploitation. 	<ul style="list-style-type: none"> ▪ Oral ▪ MCQs ▪ Short questions 	At the end of module
2. Basic terminology used in mining	8	8	Trainee will: <ul style="list-style-type: none"> ✓ Define technical terms, i.e. Tunnel, Adit, Levels, Raize, Winze, Shaft, Incline, Cross cut, Seam, Vein, Bed, Strike, True dip, Apparent dip, Fault, Rock, Mineral, Ore, Mine, Miner, Pit, Out crop, Floor, Hanging wall, Foot wall, Marken bed, Prop, Sump, Burden, Damp, Quarry, slop, ramp, berm etc 	<ul style="list-style-type: none"> ▪ Oral ▪ Practical/Demonstration ▪ MCQs ▪ Short questions 	At the end of module
3. Surface mining methods and	8		Trainee will: <ul style="list-style-type: none"> ✓ Elucidate Open-pit, Strip 	<ul style="list-style-type: none"> ▪ Oral ▪ MCQs 	At the end of module

machinery			mining, mountain top removal and quarrying methods and related machinery	<ul style="list-style-type: none"> ▪ Short questions 	
4. Underground Mining Methods and machinery	8		Trainee will: <ul style="list-style-type: none"> ✓ Define Room and Pillar, Long wall, Short wall methods of underground mine and related machinery. 	<ul style="list-style-type: none"> ▪ Oral ▪ MCQs ▪ Short questions 	At the end of module
5. Unit operations of mining	4		Trainee will: <ul style="list-style-type: none"> ✓ Recognize various unit operations of mining: drilling, blasting, loading, and transportation and supporting system 	<ul style="list-style-type: none"> ▪ Oral ▪ MCQs ▪ Short questions 	At the end of module
6. Auxiliary Operations of Mining	4		Trainee will: <ul style="list-style-type: none"> ✓ Recognize ground control, ventilation, de-watering, power supply, lighting, communication 	<ul style="list-style-type: none"> ▪ Oral ▪ MCQs ▪ Short questions 	At the end of module

Supportive notes

Assessment context:

This module provides fundamental concepts of mining. All lectures will be conducted in classroom although for mining terminology, trainee should be taken to workplace for clear understanding and first hand knowledge.

Critical aspects:

The trainer must focus on developing a clear concept of mining operations, machinery and technical terms related to mining activities.

Assessment condition:

Lecture notes and brochures related to mining activities and mine machinery should be provided to the trainees.

Resources required for assessment

The module is mostly theory based but mining related videos should be provided.

MODULE 2: Mine hazards

Learning Units	Theory Days /hours	Work place Days/ hours	Recommended formative assessment	Recommended methodology	Scheduled dates
1. Causes of mining accidents	2	18	Trainee will: <ul style="list-style-type: none"> ✓ Explain occupational injuries to the workers as a result of mining work and occurrence of any unplanned event at any mine that has the potential to cause an injury or disease to persons at work. 	<ul style="list-style-type: none"> ▪ Oral ▪ MCQs ▪ Short questions 	At the end of module
2. Roof fall	2	18	Trainee will: <ul style="list-style-type: none"> ✓ Recognize causes of periodic and major roof fall. ✓ Roof and Rib control, assessment of roof stability. ✓ Installation of roof bolts for roof stability or supplemental roof support 	<ul style="list-style-type: none"> ▪ Oral ▪ Practical/Demonstration ▪ MCQs ▪ Short questions 	At the end of module
3. Mine Gases	2	18	Trainee will: <ul style="list-style-type: none"> ✓ Define mine ventilation and mine gases. ✓ Recognize effects of hazardous gases on health of the miners. ✓ Analyze the concentration of gases in underground mines using gas detectors. 	<ul style="list-style-type: none"> ▪ Oral ▪ Practical/Demonstration ▪ MCQs ▪ Short questions 	At the end of module
4. Mine Inundation	2	18	Trainee will:	<ul style="list-style-type: none"> ▪ Oral 	At the end

			<ul style="list-style-type: none"> ✓ Recognize the classification of mine inundation. ✓ Explain technologies of preventing mine water hazards. ✓ De-watering design 	<ul style="list-style-type: none"> ▪ Practical/Demonstration ▪ MCQs ▪ Short questions 	of module
5. Use of machinery and equipment	2	18	<p>Trainee will:</p> <ul style="list-style-type: none"> ✓ Explain Safe work around moving machinery ✓ Safe Handling of sharp tools ✓ Machine guarding 	<ul style="list-style-type: none"> ▪ Oral ▪ Practical/Demonstration ▪ MCQs ▪ Short questions 	At the end of module
6. Explosive	2	18	<p>Trainee will:</p> <ul style="list-style-type: none"> ✓ Explain the safe handling, use and storage of explosives. ✓ Evacuation of workers and wildlife animals from blasting area. 	<ul style="list-style-type: none"> ▪ Oral ▪ Practical/Demonstration ▪ MCQs ▪ Short questions 	At the end of module
7. Fire	2	20	<p>Trainee will:</p> <ul style="list-style-type: none"> ✓ Explain safety precautions to prevent fire hazards. ✓ Demonstrate fire extinguishing procedures. ✓ Demonstrate appropriate use and inspection of fire extinguishers. 	<ul style="list-style-type: none"> ▪ Oral ▪ MCQs ▪ Short questions 	At the end of module
8. Ergonomic hazards	2	18	<p>Trainee will:</p> <ul style="list-style-type: none"> ✓ Recognize root cause of ergonomic hazards at work. ✓ Recognize safe handling of heavy equipment and safe working in confined conditions. ✓ Define risk factor like forceful 	<ul style="list-style-type: none"> ▪ Oral ▪ Practical/Demonstration ▪ MCQs ▪ Short questions 	At the end of module

			work, poor posture, repetitive work, vibration exposure etc.		
9. Coal Dust	2	18	Trainee will: <ul style="list-style-type: none"> ✓ Explain the potential hazards caused by pulmonary dust. ✓ The remedial measures for dust suppression will lead to safe and healthy environment. 	<ul style="list-style-type: none"> ▪ Oral ▪ Practical/Demonstration ▪ MCQs ▪ Short questions 	At the end of module

Supportive notes

Assessment context:

This module provides a complete awareness of mine hazards and occurrence of any unplanned event at any mine that has the potential to cause an injury or disease to the mine workers. Both classroom and workplace will be used for this module.

Critical aspects:

Awareness of various mine hazards should properly be communicated in order to avoid any accident at workplace. Trainee should be fully explained about safety precautions. Proper guided demonstration can minimize the risk.

Assessment condition:

Personnel protective equipments should be given to each trainee.

Resources required for assessment

Personnel protective equipments, extinguishers, gas detectors and warning signs should be provided to the trainees.

MODULE 3: Mining work place and Safety Initiatives

Learning Units	Theory Days /hours	Work place Days/ hours	Recommended formative assessment	Recommended methodology	Scheduled dates
1. Assessment of mine environments	3	16	Trainee will: <ul style="list-style-type: none"> ✓ Explain assess the mine environment ✓ Record observations as per 	<ul style="list-style-type: none"> ▪ Oral ▪ Practical/Demonstration ▪ MCQs ▪ Short questions 	At the end of module

			check list.		
2. Identification of potential hazards at work	3	16	<p>Trainee will:</p> <ul style="list-style-type: none"> ✓ Deal with identified hazardous conditions and implementation of safety measures. 	<ul style="list-style-type: none"> ▪ Oral ▪ Practical/Demonstration ▪ MCQs ▪ Short questions 	At the end of module
3. Deal with hazardous conditions	3	16	<p>Trainee will:</p> <ul style="list-style-type: none"> ✓ Explain threshold limits of mine gases and dust. ✓ Implement safety measures against dust, mine gases, strata security, machinery and equipment, mine ventilation, use of explosives, transportation of men and materials, mine inundation and mine fires. 	<ul style="list-style-type: none"> ▪ Oral ▪ Practical/Demonstration ▪ MCQs ▪ Short questions 	At the end of module
4. Traffic Management	3	16	<p>Trainee will:</p> <ul style="list-style-type: none"> ✓ Control the risk of accidents involving plant and ancillary vehicles using traffic management plant and safety signs. 	<ul style="list-style-type: none"> ▪ Oral ▪ Practical/Demonstration ▪ MCQs ▪ Short questions 	At the end of module
5. Safe use of operating equipment	3	16	<p>Trainee will:</p> <ul style="list-style-type: none"> ✓ Inspect all operating equipments at work ✓ Handle operating equipment safely and guard operating parts of machine if needed. ✓ Check posted safety signs on equipment. 	<ul style="list-style-type: none"> ▪ Oral ▪ Practical/Demonstration ▪ MCQs ▪ Short questions 	At the end of module
6. Safe handling and use of mine	3	16	<p>Trainee will:</p> <ul style="list-style-type: none"> ✓ Explain safe handling and 	<ul style="list-style-type: none"> ▪ Oral ▪ Practical/Demonstration 	At the end of module

materials			transportation of mine materials ✓ Implement the use of Use of Personnel Protective equipment	<ul style="list-style-type: none"> ▪ MCQs ▪ Short questions 	
7. Lockout and tagging equipment and energy	3	16	Trainee will: ✓ Recognize the proper control of equipments and energy sources in order to prevent workers from harmful effects of hazardous energy. ✓ Demonstrate Lockout and Tagging procedures for various electrical, mechanical, hydraulic and pneumatic equipments and tools.	<ul style="list-style-type: none"> ▪ Oral ▪ Practical/Demonstration ▪ MCQs ▪ Short questions 	At the end of module
8. Safety Signs at work	3	16	Trainee will: ✓ Demonstrate posting of safety signs at various workplaces in order to communicate safety information.	<ul style="list-style-type: none"> ▪ Oral ▪ Practical/Demonstration ▪ MCQs ▪ Short questions 	At the end of module
9. Signaling and Warning System in Mines	3	16	Trainee will: ✓ Explain signaling and warning system such as audible or visual alarms, telephones, and messengers to warn mine workers from fire hazard or other emergency.	<ul style="list-style-type: none"> ▪ Oral ▪ Practical/Demonstration ▪ MCQs ▪ Short questions 	At the end of module

Supportive notes

Assessment context:

This module provides the series of initiatives to be taken for making mining environment safer and comfortable for the miners. Learning units of this module totally related to workplace where these initiatives should be implemented properly.

Critical aspects:

Inspection of workplace for imminent danger and removing hazard will be the key component of this module. Placement of Safety signs can reduce the chance of accidents at workplace.

Assessment condition:

Trainee should be taken to mining activities for module assessment

Resources required for assessment

Safety Signs, Signaling and warning system, Lockout and tagging devices.

MODULE 4: Mining Workplace and occupational health hazard

Learning Units	Theory Days /hours	Work place Days/ hours	Recommended formative assessment	Recommended methodology	Scheduled dates
1. Assessment of mine environments relating to health issues	8	8	Trainee will: ✓ Recognize the assessment of the mine environment on health issues	<ul style="list-style-type: none">▪ Oral▪ Practical/Demonstration▪ MCQs▪ Short questions	At the end of module
2. Identification of occupational diseases	4	8	Trainee will: ✓ Explain the inspection of various parts of the mine for assessment of health hazards with regards to occupational diseases	<ul style="list-style-type: none">▪ Oral▪ Practical/Demonstration▪ MCQs▪ Short questions	At the end of module
3. Medical Follow up	8	16	Trainee will: ✓ Explain the importance of	<ul style="list-style-type: none">▪ Oral▪ Practical/Demonstration	At the end of module

			periodical medical checkup of workers ✓ Report the suspected persons to an identified medical care center through mine management	<ul style="list-style-type: none"> ▪ MCQs ▪ Short questions 	
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Supportive notes

Assessment context:

For identification of possible occupational diseases periodical medical checkup of miners can reduce the health hazards. Both classroom and workplace will be used for this module.

Critical aspects:

In this module, trainees are required to observe the periodical medical checkup of miners.

Assessment condition

Trainee should be taken to identified medical care center for medical follow up of suspected persons.

Resources required for assessment

Reports of medical follow up of mine workers .

MODULE 5: Perform Communication

Learning Units	Theory Days /hours	Work place Days/ hours	Recommended formative assessment	Recommended methodology	Scheduled dates
1. Effective communication	3	12	Trainee will: <ul style="list-style-type: none"> ✓ Use variety of Communication processes. ✓ Communicate any emergency to emergency rescue team for conducting rescue work timely at workplace. 	<ul style="list-style-type: none"> ▪ Oral ▪ Practical/Demonstration ▪ MCQs ▪ Short questions 	At the end of module

2. Person-to-person or interpersonal communication	4	20	<p>Trainee will:</p> <ul style="list-style-type: none"> ✓ Communicate Information related to the emergency ✓ Demonstrate the interpersonal communication for work related directions, clarification and emergency information. 	<ul style="list-style-type: none"> ▪ Oral ▪ Practical/Demonstration ▪ MCQs ▪ Short questions 	At the end of module
3. Speak clearly and concisely		16	<p>Trainee will:</p> <ul style="list-style-type: none"> ✓ Use common language at workplace which can be understood by majority of the workers. ✓ Use clear and concise Communication ✓ Use workplace specific vocabulary and gestures 	<ul style="list-style-type: none"> ▪ Oral ▪ Practical/Demonstration ▪ MCQs ▪ Short questions 	At the end of module
4. Listen actively		16	<p>Trainee will:</p> <ul style="list-style-type: none"> ✓ Demonstrate the attention to any message receiving in case of any emergency. ✓ Demonstrate active listening in case of receiving instruction about safety 	<ul style="list-style-type: none"> ▪ Oral ▪ Practical/Demonstration ▪ MCQs ▪ Short questions 	At the end of module
5. Use two-way radio /electronic communication	4	12	<p>Trainee will:</p> <ul style="list-style-type: none"> ✓ Demonstrate the proper use of two-way radio or electronic communication. ✓ Communicate sensitive issues or information regarding any hazard using walkie-talkie, radio and other sources of communication. 	<ul style="list-style-type: none"> ▪ Oral ▪ Practical/Demonstration ▪ MCQs ▪ Short questions 	At the end of module

6. Use appropriate hand signals for job		14	Trainee will: ✓ Demonstrate the use different hand signals often used at workplace and conformation of hand signals.	<ul style="list-style-type: none"> ▪ Oral ▪ Practical/Demonstration ▪ MCQs ▪ Short questions 	At the end of module
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Supportive notes

Assessment context:

Effective communication can reduce the risk factor at work. Both classroom and workplace will be used for this module.

Critical aspects:

In this module, trainees are required to use two-way radio or electronic communication at workplace for communicating sensitive issues or information regarding any hazard.

Assessment condition

Trainee should be taken to mining operations where they can demonstrate their abilities for interpersonal communication or two-way communication.

Resources required for assessment

Tw-way radio/electronic communication.

MODULE 6: Responding to a Mine Emergency

Learning Units	Theory Days /hours	Work place Days/ hours	Recommended formative assessment	Recommended methodology	Scheduled dates
1. Initiate an Emergency Mine Evacuation Plan	4	22	Trainee will: ✓ Initiate an immediate mine evacuation in the event of a mine emergency using mine plan, ventilation plan, evacuation plan and procedures.	<ul style="list-style-type: none"> ▪ Oral ▪ Practical/Demonstration ▪ MCQs ▪ Short questions 	At the end of module
2. Contact	4	22	Trainee will:	<ul style="list-style-type: none"> ▪ Oral 	At the end

Emergency Personnel			<ul style="list-style-type: none"> ✓ Communicate mine emergency to all emergency personnel and local coordination like security, medical assistance, logistics, traffic control, supplies and the layout of surface facilities. 	<ul style="list-style-type: none"> ▪ Practical/Demonstration ▪ MCQs ▪ Short questions 	of module
3. Help in Organizing establishment of Command Center	4	22	<p>Trainee will:</p> <ul style="list-style-type: none"> ✓ Help to organize a command center that receives information and communicate during rescue operation. 	<ul style="list-style-type: none"> ▪ Oral ▪ Practical/Demonstration ▪ MCQs ▪ Short questions 	At the end of module
4. Functions of command center	4	22	<p>Trainee will:</p> <ul style="list-style-type: none"> ✓ Explain the functioning of command center in flow of communication, traffic, mobilization of men and materials, coordination with media and other stakeholders about the rescue and recovery measures 	<ul style="list-style-type: none"> ▪ Oral ▪ Practical/Demonstration ▪ MCQs ▪ Short questions 	At the end of module
5. First-Aid	4	22	<p>Trainee will:</p> <ul style="list-style-type: none"> ✓ Provide first-aid facilities and services required for the initial treatment of persons suffering from injury or illness at a workplace. ✓ Respond to life-threatening emergencies ✓ Respond to non-life- 	<ul style="list-style-type: none"> ▪ Oral ▪ Practical/Demonstration ▪ MCQs ▪ Short questions 	At the end of module

			threatening emergencies	
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Supportive notes

Assessment context:

This module provides sequence of steps needed for responding to a mine emergency. Mine emergencies like fires, coal dust or methane gas explosions, toxic gases, roof fall and inrush of water in to mine can be handled, responding the same way. Workplace will be used for this module.

Critical aspects:

Responding to a mine emergency and rescue of survivors will be the key component of this module.

Assessment condition:

Trainee should be taken to existing underground coal mines for efficient management of emergency operations.

Resources required for assessment

Personnel protective equipment, communication system, first-aid box and portable firefighting equipment should be provided to the trainees.

MODULE 7: Skills Development

Learning Units	Theory Days /hours	Work place Days/ hours	Recommended formative assessment	Recommended methodology	Scheduled dates
1. Career Advancement	16		Trainee will: ✓ Explain the importance of career advancement. ✓ Explain advanced learning tools for making career more successful.	<ul style="list-style-type: none"> ▪ Oral ▪ MCQs ▪ Short questions 	At the end of module
2. Attend Training Programs and workshops	8	32	Trainee will: ✓ Describe the benefits of training programs and workshops. ✓ Demonstrate the practical activities of dealing any emergency.	<ul style="list-style-type: none"> ▪ Oral ▪ Practical/Demonstration ▪ MCQs ▪ Short questions 	At the end of module

3. Consult Seniors		16	<p>Trainee will:</p> <ul style="list-style-type: none"> ✓ Share the typical issues often occur at workplace. ✓ Solve the issues by taking the advantage of seniors. 	<ul style="list-style-type: none"> ▪ Oral ▪ Practical/Demonstration ▪ MCQs ▪ Short questions 	At the end of module
4. Read Mining Books		16	<p>Trainee will:</p> <ul style="list-style-type: none"> ✓ Enhance the knowledge of advanced technologies of mining. ✓ Explore the health, safety and environmental issues and the procedures of making mine environment safer for the others. 	<ul style="list-style-type: none"> ▪ Oral ▪ MCQs ▪ Short questions 	At the end of module
5. Explore Internet		28	<p>Trainee will:</p> <ul style="list-style-type: none"> ✓ Explore the world of mining. ✓ Get videos related to mining and hazards ✓ Download Mining books and literature 	<ul style="list-style-type: none"> ▪ Oral ▪ MCQs ▪ Short questions 	At the end of module

Supportive notes

Assessment context:

This module provides advanced learning tools for making career more successful. Classroom and workplace and computer lab will be used for this module.

Critical aspects:

In this module, trainees are required to use internet for exploring the world of mining.

Assessment condition:

Trainee should be taken to computer laboratory or library for appropriate assessment.

Resources required for assessment

Books, laptop and internet.

List of Tools, Machinery & Equipment

Name of Trade	Health & Safety Supervisor- Mining Sector
Duration	06 Months

Sr. No.	Name of Item/ Equipment / Tools	Qty.
1.	Personnel Protective Equipments (PPEs)	10
2.	Gas detectors	2
3.	Hygrometer	2
4.	Portable Extinguishers	5
5.	First aid box and kit	10
6.	Smoke Tester	2
7.	Explosion proof LED mining Light	10
8.	Potable de-watering Pumps and pipes	2
9.	Two-way radio/electronic communication system	10
10.	Lockout and Tagging devices: Scissors, Chains, Blocks or Cribbing, Pins and	5

	clamps	
11.	Safety signs and signals Safety signs prohibition sign warning sign mandatory sign emergency escape or first-aid sign Emergency exit/escape route signs Firefighting signs	20
12.	Alarms and signals Horns Bells Sirens Whistles Buzzers Fire alarms.	10

13.	Laptop and Internet	02
14.	<p style="text-align: center;">Recommended Contents of First-Aid Box and Kits</p> <p>Clinical Thermometer, Blood pressure measuring device, Small flashlight, Manual Inhaler, First-aid Cotton, Hypoallergenic adhesive Elastic bandages of various sizes, Triangular bandages, Splints, Anti-septic solution, Peroxide water, Physiological serum, Alcohol, Safety pins, Cotton swabs, T Tweezers, Scissors, Knife, Ointment for wounds or burns</p>	

List of Consumable Supplies

Name of Trade	Health & Safety Supervisor- Mining Sector
Duration	06 Months

Sr. No.	Name of Consumable Supplies
1.	Safety signs
2.	Batteries for gas detectors
3.	Ointment for wounds or burns
4.	First-aid Cotton
5.	Cotton swabs
6.	Triangular bandages
7.	Anti-septic solution
8.	Elastic bandages
9.	Hypoallergenic adhesive

10.	Safety Gloves
11.	Goggles
12.	Safety Shoes
13.	Dust Mask
14.	Gas Mask
15.	Safety Helmets
16.	Safety ear muffs

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