



Model Curriculum

QP Name: Mine Shotfirer/Blaster

Elective: Underground Metal/ Opencast/ Underground Coal

QP Code: MIN/Q1302

QP Version: 2.0

NSQF Level: 4

Model Curriculum Version: 2.0

Skill Council for Mining Sector || B-311, Okhla Industrial Area, Phase-I, New Delhi-110020
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Training Parameters

Sector	Mining
Sub-Sector	Mining Operation
Occupation	Shot firing/Blasting
Country	India
NSQF Level	4
Aligned to NCO/ISCO/ISIC Code	NCO-2015/7542.0100
Minimum Educational Qualification and Experience	12th Class (or its equivalent) with 3 Years of relevant experience OR Certificate-NSQF (Level 3: Explosives Handler or Jr. Mine Blaster) with Class 12th pass or its equivalent, with 2 Years of experience relevant
Pre-Requisite License or Training	Valid Gas Testing Certificate (only for underground mines) and First-Aid Certificate
Minimum Job Entry Age	20 Years
Last Reviewed On	30/06/2022
Next Review Date	30/06/2025
NSQC Approval Date	30/06/2022
QP Version	2.0
Model Curriculum Creation Date	30/06/2022
Model Curriculum Valid Up to Date	30/06/2025
Model Curriculum Version	2.0
Minimum Duration of the Course	540 hours
Maximum Duration of the Course	540 hours

Program Overview

This section summarizes the end objectives of the program along with its duration.

Training Outcomes

At the end of the program, the learner will be able to:

- Explain how to receive and handle explosive materials in mines
- Show how to charge blast holes and deal with misfires
- Discuss how to follow Health, Safety and Environmental guidelines for Underground Metalliferous Mines (UMM)
- Discuss how to follow Health, Safety, and Environmental guidelines for opencast mines
- Discuss how to follow Health, Safety, and Environmental guidelines for Underground Coal Mines

Compulsory Modules

The table lists the modules, their duration and mode of delivery.

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
Bridge Module	10:00	00:00	00:00		10:00
Module 1 - Introduction to the sector and the job role of Mine Shotfirer/Blaster	10:00	00:00	00:00		10:00
MIN/N1307: Receive and Handle Explosive Materials in mines NOS Version No. 1 NSQF Level- 4	30:00	60:00	50:00		140:00
Module 2: Receive and Handle Explosive Materials in mines	30:00	60:00	50:00		140:00
MIN/N1308: Charge Blast Holes and deal with misfires NOS Version No. 1 NSQF Level- 4	60:00	70:00	80:00		210:00
Module 3: Charge Blast Holes and deal with misfires	60:00	70:00	80:00		210:00
DGT/VSQ/N0102: Employability Skills (60 Hours) NOS Version No. 1 NSQF Level- 4	24:00	36:00	00:00	-	60:00

Introduction to Employability Skills	00:30	01:00	00:00	-	01:30
Constitutional values - Citizenship	00:30	01:00	00:00	-	01:30
Becoming a Professional in the 21st Century	01:00	01:30	00:00	-	02:30
Basic English Skills	04:00	06:00	00:00	-	10:00
Career Development & Goal Setting	01:00	01:00	00:00	-	02:00
Communication Skills	02:00	03:00	00:00	-	05:00
Diversity & Inclusion	01:00	01:30	00:00	-	02:30
Financial and Legal Literacy	02:00	03:00	00:00	-	05:00
Essential Digital Skills	04:00	06:00	00:00	-	10:00
Entrepreneurship	03:00	04:00	00:00	-	07:00
Customer Service	02:00	03:00	00:00	-	05:00
Getting Ready for Apprenticeship & Jobs	03:00	05:00	00:00	-	08:00
Total Duration	124:00	166:00	130:00	-	420:00

Elective Modules - (mandatory to select at least one)

The table lists the elective modules, their duration and mode of delivery.

Elective 1: Underground Metal

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
MIN/N1702: Follow Health, Safety, and Environmental guidelines for Underground Metalliferous Mines (UMM) (Including Mine Vocational Training Rule and Mine Rescue Rule) NOS Version No. 1.0 NSQF Level- 4	20:00	50:00	50:00		120:00
Follow Health, Safety, and Environmental guidelines for Underground Metalliferous Mines	20:00	50:00	50:00		120:00
Total Duration	20:00	50:00	50:00		120:00

Elective 2: Opencast

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
MIN/N1703: Follow Health, Safety, and Environmental Guidelines for opencast mines (Including Mine Vocational Training Rule) NOS Version No. 1.0 NSQF Level- 4	20:00	50:00	50:00		120:00
Follow Health, Safety, and Environmental Guidelines for opencast mines	20:00	50:00	50:00		120:00
Total Duration	20:00	50:00	50:00		120:00

Elective 3: Underground Coal

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
MIN/N1704: Follow Health, Safety, and Environmental guidelines for underground coal mines (Including Mine Vocational Training Rule and Mine Rescue Rule) NOS Version No. 1.0 NSQF Level- 4	20:00	50:00	50:00		120:00
Follow Health, Safety, and Environmental guidelines for underground coal mines	20:00	50:00	50:00		120:00
Total Duration	20:00	50:00	50:00		120:00

Module Details

Module 1: Introduction to the sector and the job role of Mine Shotfirer/Blaster

Bridge Module

Terminal Outcomes:

- Discuss the scope of mining industry
- Explain the role and responsibility of the Mine Shotfirer/Blaster

Duration:10:00	Duration:00:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Describe the concept of Underground Mining and Opencast Mining Process. • Discuss the role and the importance of the Mine Shotfirer/Blaster. • Explain various types of risks and hazards involved in Mines. • Discuss regulatory context specified to work in Mines. • Explain the characteristic features of Metal mines and Coal Mines. • Explain provision of wages, working hours and accident compensation as per the Mine Act. 	
Classroom Aids	
LCD Projector, Laptop/Computer with internet, White Board, Flip Chart, Markers	
Tools, Equipment and Other Requirements	
Posters for describing different types of mines and associated operations	

Module 2: Receive and Handle Explosive Materials in mines

Mapped to MIN/N1307, v1.0

Terminal Outcomes:

- Explain how to receive and handle explosive materials
- Describe how to determine the blasting requirements
- Illustrate how to design and arrange for authorization of the blast specification

Duration: 30:00	Duration: 60:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Describe different types of mines and detail of the mine a person is working in. • Discuss how to obtain all explosive materials correctly and check conformity with the requirements of the blasting specification. • Discuss about the classification of mines as per degree of gassiness. • Explain how to complete the records accurately and make them available to authorised persons. • Illustrate benching in quarries, dressing of overhangs, undercuts, fencing, first aid and hygiene. • Discuss how to contain all explosive materials safely and securely and take precautions to avoid any loss or damage. • Discuss about the approved size and galleries accordance to the dept. of mines. • Explain how to apply the approved routes when transporting explosive materials. • Throw light on the standing orders in force at the mine, safety in the vicinity of machinery. • Illuminate on the shot-firing and safety regulations and importance of taking shelter at miner stations allotted to miners at times of short firing. • Discuss how to display relevant danger notices in conformity with operational and organizational rules and procedures and with relevant legislation. • Explain how to locate the area of blasting. • Discuss how to interpret the requirements to conform to the overall development plans of the site. • Explain how to interpret the geological makeup of the ground and mineral strata visually and evaluate for matching with the specified requirements. • Discuss about the duties and responsibility of short firer reg 49 of CMR 2017. 	<ul style="list-style-type: none"> • Demonstrate how to handle the explosive materials and move safely in accordance with operational and organisational procedures and relevant legislation requirements. • Show how to check the quality and extent of mineral materials for removal and confirm with the relevant persons (e.g. manager; explosives supervisor; blasting team; contractors: geotechnical specialist) and the operational requirements. • Demonstrate how to collect and record the dimensional information in accordance with the blast specification Requirements. • Demonstrate how to check the drill plan. • Display how to determine types of explosive materials method of initiation and blasting system and clearly stipulate in accordance with operational and organisation rules and procedures and compliance with legislative requirements. • Role-play the situation on how to communicate the agreed upon blast specifications to concerned stakeholders, in accordance with operational and organizational rules and procedures and comply with legislative requirements.

- Throw light on the provision of wages, working hours and accident compensation as per Mines act.
- Explain how to identify the geological anomalies of the blast site visually and take into account in the blast design.
- Discuss about the mining safety procedures, impact of violation of safety procedures and importance of PPE by workmen.
- Explain how to ensure that the output of the blast is confirmed to meet with the site requirements.
- Throw light on the relevant standards and procedures followed in the company.
- Describe how to determine the extent of the blast from the production requirements, the fragmentation and geological makeup of the ground and mineral strata, face provision and availability and drill size.
- List different types of approved apparatus requirements at the mine.
- Discuss about the importance of firefighting and mine ventilation.
- Explain how to check the effects of a blast on plant, buildings, external features and the surrounding Environment.
- Tell how to identify the potential hazards and danger sources and record in the blast specification.
- Describe the processes like Procurement, Store management, inventory management, quality management and key contact points for query resolution.
- List the types and range of explosive materials, their strength and characteristics (to include explosives; detonating devices; blasting agents; blasting accessories).
- Describe how to carry out the work to approved procedures and practices and in compliance with statutory requirements.
- List the types of initiating systems.
- Describe the effects on blast performance of variations in blast specification.
- Explain how to collect information from previous blasts at the site and examine and evaluate information in determining the blast design.
- Discuss how to analyse constraints and capabilities of plant and equipment used for moving and processing mineral materials and factor the same in the blast design.

<ul style="list-style-type: none"> • Discuss about the approved procedures and practices in the context of the operations, the work activity and the workplace environment to include organizational; environmental; regulatory; emergency; operational. • Explain how to ensure rules and procedures for the storing, transporting and handling of explosives are clearly established which comply with legislative requirements carrying out specific techniques (transport, design, blasting, safety) carried out in underground and open cast mine working. • Discuss about the responsibilities of blaster and relevant others under the health and safety statutory requirements. • Discuss how to ensure that requirements for safety and security of the blast operations are clearly identified and communicated. • Tell how to recognise detonator types and delays. • Explain how to obtain authorisation of the blast specification in accordance with operational and organisational rules and procedures and comply with legislative requirements. • Discuss about the digging/loading capability of blast site loading equipment. • Illuminate on the strength and formation of mineral strata. • Describe the danger of blasting in hot strata. • Discuss about the potential dangers/hazards during transportation and the safety procedures when loading and unloading explosive materials. • Explain the manufacturers' recommendations for handling explosives and detonators. • Discuss about the detailed understanding of Mine working and environmental impact of mining as well as dangers associated with environmental conditions. • Throw light on the dangers of induced currents from external sources. • Discuss about the precaution for deep hole blasting, sleeping holes. • List the precaution and bulk transport of explosives in open cast working. 	
Classroom Aids	
LCD Projector, Laptop/Computer with internet, White Board, Flip Chart, Markers	
Tools, Equipment and Other Requirements	



Dummy detonator, dummy explosive, dummy Exploder, Copper Scraper, Stemming Rod, Blasting Cable, Packer /Spacer, Crimper, dummy Safety Fuse / Codex, Signaling Torch, Red Flag, Alarming System

Module 3: Charge Blast Holes and deal with misfires

Mapped to MIN/N1308, v1.0

Terminal Outcomes:

- Illustrate how to charge blast holes
- Explain how to blast as per specification
- Discuss how to deal with Misfires

Duration: 60:00	Duration: 70:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Describe different types of mines and detail of the mine a person is working in. • Explain how to check each blast hole is checked for condition, dimension, angle, inclination and direction, as appropriate, to ensure it is suitable for charging to the blast specification. • Discuss about mine organisation, time keeping, need for discipline and punctuality. • Explain how to identify, record and report any variations to the blasting specification and confirm with the appropriate persons. • Explain benching in quarries, dressing of overhangs, undercuts, fencing, first aid and hygiene. • Discuss about standing orders in force at the mine. safety in the vicinity of machinery. • Throw light on the shot-firing and safety regulations, how and where to take shelter. • Illustrate how to charge the blast holes in accordance with the blasting specification. • Discuss about the duties of workmen and provision of wages, working hours and accident compensation as per mines act. • Explain how to identify and report the variations between the specification and the actual conditions at the time of charging in conformity with operational and organizational rules and procedures. • Discuss about mining safety procedures and impact of violation of safely procedures. • Discuss how to return the explosive materials which are surplus to requirements to store and correctly package and label and maintain the records. • Throw light on the relevant standards and procedures followed in the company. • Explain how to interpret and implement the approved procedures and practices for disposal of surplus materials. 	<ul style="list-style-type: none"> • Demonstrate how to prepare the required quantities of explosives in accordance with the blast specification. • Show how to check the explosives to ensure they conform, in quantity and type, to the blasting specification. • Demonstrate how to place detonators and primers accurately in conformity with the blasting specification. • Show how to protect the connections against adverse environmental conditions, premature ignition and mechanical damage. • Display how to provide clear notification to public of intention to fire the explosive. • Demonstrate how to record the type and quantity of explosive materials and means of initiation in accordance with organizational and operational procedures. • Show how to record and report the method of dealing with the misfire clearly and accurately in accordance with operational and organizational procedures. • Show how to ensure that explosives and detonating devices are recovered and disposed of correctly and safely.

- Explain how to connect the ignition system for the explosive accurately in conformity with the blast Specification.
- List different types of electrical requirements at the mine.
- Discuss how to implement operational safety procedures whilst preparing the initiation circuit and connecting the ignition system in conformity with approved procedures and practices.
- Explain how to check the ignition system and initiation sequences thoroughly in accordance with operational and organizational rules and procedures and relevant legislation.
- Throw light on the processes like procurement, store management, inventory management, quality management and key contact points for query resolution.
- Discuss how to clear and secure the specified danger zone effectively in compliance with operational and organizational rules and procedures and the blast specification.
- List the types and range of explosive materials, their strength and characteristics (to include explosives; detonating devices; blasting agents; blasting accessories).
- Explain how to maintain security of exploder in compliance with relevant explosives regulations, operational and organizational rules and procedures.
- List types of initiating systems.
- List types of detonating devices and explosives used.
- Describe delayed detonators, how the delay is created and how to recognize detonator types and delays.
- Discuss how to fire the explosive when all safety precautions have been taken and verified.
- Explain how to identify and deal with faults that cannot be rectified.
- List types of approved circuit testers.
- Discuss about the initiation sequences for blasting patterns and the possible effects on the time delay period between individual charges.
- Illustrate blast patterns.
- Explain how to inspect the blast area (including where applicable, the face, crest

and pile) thoroughly in accordance with site rules and operational procedures.

- Describe circuit testing for electrical initiation.
- List types of initiation and premature ignitions.
- Discuss how to provide the all clear on satisfaction that the area is safe and the blasting operation is complete.
- Throw light on the types and uses of blasting/shotfiring equipment.
- State the causes of and dangers from fly-rock.
- Explain how to recognize misfires correctly, actions to be taken and communicate to appropriate person(s).
- Explain how to mark the located misfire in accordance with operational and organizational rules and procedures.
- Discuss about the warning systems deployed at the blast site (e.g. site radio; siren; flags; hand signals; warning signs).
- Describe how to secure the exclusion zone in conformity with operational and organizational rules and Procedures.
- Explain the issues likely to arise from the blast operation.
- Explain how to secure the area of recovery for unexploded explosives and isolate until recovery has been carried out and the area is made safe.
- Illustrate how to ensure that the method of recovery used for unexploded charges minimizes the risk of accidental initiation and is in conformity with operational and organizational rules and procedures for misfires.
- Explain the reasons for post-blast slippage of ground and its effects.
- Discuss about the dangerous effects of fumes created by blasting.
- Explain the monitoring process for recordings of ground vibration/air over pressure.
- Throw light on the hazards associated with misfires and unexploded charges.
- Explain how to systematic testing to reveal location of faults in a circuit.
- Discuss about recognition of undisturbed ground and indications of unfired charges after blasting.
- Explain the calibration requirements for exploders.

<ul style="list-style-type: none"> • Describe the marking of misfires. • Illuminate on the types, causes and avoidance of misfires. • Discuss about desensitization of bulk/loose grain explosives. • Explain the responsibilities of the blaster and relevant others under the health and safety statutory requirements. • Discuss about the relevant legislation associated to the handling and movement of explosives. • Discuss about the operational and organizational procedures and practices for handling and transport of explosives. • Explain the requirements for checking explosives type and condition. • Throw light on the dangers of induced currents from external sources. • Explain the precautions for blasting as per weather conditions. • State various kinds of the blasting hazards. • Describe the importance of free face. • Discuss on the environmental effects of blasting Ground vibration and flying fragments and how to control them and precautions to be taken for them. • Explain muffle blasting. • Illustrate checking and clearing of choked holes before charging/loading. • Explain how to use of LOX, ANFO Blasting by bulk loading system, etc. • Discuss about charging of hole in watery strata, hot strata and in bad weather. 	
<p>Classroom Aids</p>	
<p>LCD Projector, Laptop/Computer with internet, White Board, Flip Chart, Markers</p>	
<p>Tools, Equipment and Other Requirements</p>	
<p>Dummy detonator, dummy explosive, dummy Exploder Copper Scraper, Stemming Rod, Blasting Cable, Packer /Spacer, Crimper, dummy Safety Fuse / Codex, Signaling Torch, Red Flag, Alarming System</p>	

Employability Skills (60 Hours)

Mapped to DGT/VSQ/N0102, v1.0

Key Learning Outcomes

Introduction to Employability Skills

Duration: 1.5 Hours

1. Discuss the Employability Skills required for jobs in various industries
2. List different learning and employability related GOI and private portals and their usage

Constitutional values - Citizenship

Duration: 1.5 Hours

3. Explain the constitutional values, including civic rights and duties, citizenship, responsibility towards society and personal values and ethics such as honesty, integrity, caring and respecting others that are required to become a responsible citizen
4. Show how to practice different environmentally sustainable practices.

Becoming a Professional in the 21st Century

Duration: 2.5 Hours

5. Discuss importance of relevant 21st century skills.
6. Exhibit 21st century skills like Self-Awareness, Behavior Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn etc. in personal or professional life.
7. Describe the benefits of continuous learning.

Basic English Skills

Duration: 10 Hours

8. Show how to use basic English sentences for everyday conversation in different contexts, in person and over the telephone
9. Read and interpret text written in basic English
10. Write a short note/paragraph / letter/e-mail using basic English

Career Development & Goal Setting

Duration: 2 Hours

11. Create a career development plan with well-defined short- and long-term goals

Communication Skills

Duration: 5 Hours

12. Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette.
13. Explain the importance of active listening for effective communication
14. Discuss the significance of working collaboratively with others in a team

Diversity & Inclusion

Duration: 2.5 Hours

15. Demonstrate how to behave, communicate, and conduct oneself appropriately with all genders and PwD
16. Discuss the significance of escalating sexual harassment issues as per POSH act.

Financial and Legal Literacy

Duration: 5 Hours

17. Outline the importance of selecting the right financial institution, product, and service
18. Demonstrate how to carry out offline and online financial transactions, safely and securely
19. List the common components of salary and compute income, expenditure, taxes, investments etc.
20. Discuss the legal rights, laws, and aids

Essential Digital Skills

Duration: 10 Hours

21. Describe the role of digital technology in today's life
22. Demonstrate how to operate digital devices and use the associated applications and features, safely and securely
23. Discuss the significance of displaying responsible online behavior while browsing, using various social media platforms, e-mails, etc., safely and securely
24. Create sample word documents, excel sheets and presentations using basic features
25. utilize virtual collaboration tools to work effectively

Entrepreneurship

Duration: 7 Hours

26. Explain the types of entrepreneurship and enterprises
27. Discuss how to identify opportunities for potential business, sources of funding and associated financial and legal risks with its mitigation plan
28. Describe the 4Ps of Marketing-Product, Price, Place and Promotion and apply them as per requirement

29. Create a sample business plan, for the selected business opportunity	
Customer Service	Duration: 5 Hours
30. Describe the significance of analyzing different types and needs of customers	
31. Explain the significance of identifying customer needs and responding to them in a professional manner.	
32. Discuss the significance of maintaining hygiene and dressing appropriately	
Getting Ready for apprenticeship & Jobs	Duration: 8 Hours
33. Create a professional Curriculum Vitae (CV)	
34. Use various offline and online job search sources such as employment exchanges, recruitment agencies, and job portals respectively	
35. Discuss the significance of maintaining hygiene and confidence during an interview	
36. Perform a mock interview	
37. List the steps for searching and registering for apprenticeship opportunities	

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training Experience		Remarks
		Years	Specialization	Years	Specialization	
Graduate/CITS	Any discipline	-	-	2	Teaching experience	Prospective ES trainer should: <ul style="list-style-type: none"> • have good communication skills • be well versed in English • have digital skills • have attention to detail • be adaptable • have willingness to learn
Current ITI trainers	Employability Skills Training (3 days full-time course done between 2019-2022)	-	-	-	-	
Certified current EEE trainers (155 hours)	from Management SSC (MEPSC)	-	-	-	-	
Certified Trainer	Qualification Pack: Trainer (MEP/Q0102)	-	-	-	-	

Trainer Certification	
Domain Certification	Platform Certification
<p>Certified in 60-hour Employability NOS (2022), with a minimum score of 80%</p> <p>OR</p> <p>Certified in 120-, 90-hour Employability NOS (2022), with a minimum score of 80%</p>	<p>MEP/Q2601, v2.0 Trainer (VET and Skills). Minimum accepted score as per SSC guideline is 80%.</p>

Master Trainer Requirements

Master Trainer Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training Experience		Remarks
		Years	Specialization	Years	Specialization	
Graduate/CITS	Any discipline	-	-	3	Employability Skills curriculum training experience with an interest to train as well as orient other peer trainers	<p>Prospective ES Master trainer should:</p> <ul style="list-style-type: none"> • have good communication skills • be well versed in English • have basic digital skills
Certified Master Trainer	Qualification Pack: Master Trainer (MEP/Q2602)	-	-	3	EEE training of Management SSC (MEPSC) (155 hours)	<ul style="list-style-type: none"> • have attention to detail • be adaptable • have willingness to learn • be able to grasp concepts fast and is creative with teaching practices and likes sharing back their learning with others

Master Trainer Certification	
Domain Certification	Platform Certification
<p>Certified in 60-hour Employability NOS (2022), with a minimum score of 90%.</p> <p>OR</p> <p>Certified in 120-, 90-hour Employability NOS (2022), with a minimum score of 90%</p>	<p>MEP/Q2602, v2.0 Master Trainer (VET and Skills). Minimum accepted score as per SSC guideline is 90%.</p>

Assessment Strategy

The trainee will be tested for the acquired skill, knowledge and attitude through formative/summative assessment at the end of the course and as this NOS and MC is adopted across sectors and qualifications, the respective AB can conduct the assessments as per their requirements.

LIST OF TOOLS & EQUIPMENT FOR EMPLOYABILITY SKILLS		
S No.	Name of the Equipment	Quantity
1.	Computer (PC) with latest configurations – and Internet connection with standard operating system and standard word processor and worksheet software (Licensed) (all software should either be latest version or one/two version below)	As required
2.	UPS	As required
3.	Scanner cum Printer	As required
4.	Computer Tables	As required
5.	Computer Chairs	As required
6.	LCD Projector	As required
7.	White Board 1200mm x 900mm	As required

Note: Above Tools & Equipment not required, if Computer LAB is available in the institute.

Proposed Assessment Strategy/Guidelines:

1. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria mentioned above).
2. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/ training center based on these criteria.

Module 4: Follow Health, Safety, and Environmental guidelines for Underground Metalliferous Mines

Mapped to MIN/N1702, v1.0

Terminal Outcomes:

- Discuss about the worksite health and safety measures, and environmental guidelines

Duration: 20:00	Duration: 50:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Explain how to undertake "The Take-5 (Personal Risk Assessment)" before commencement of any work (DGMS Tech. circulars 2/2014). • Discuss how to comply with safety, health and security-related regulations/guidelines at the mine e.g. follow Standard Operating Procedure (SOP) for material handling in underground (U/G) mine, safety guidelines specified by Directorate General of Mine Safety (DGMS). • List the precautions to be followed against U/G electrical appliances. • List appropriate safety practices while traveling on U/G haul roads, in case of post blast fumes and misfire. • Discuss the manufacturer's instructions for care and safe operation of mine machinery and equipment. • Discuss about various types of gases found in the mine and their effect. • Discuss the laid out procedure to be followed in case of gas detecting alarm signal on leakage of inflammable gases. • Shed light on how to use appropriate PPE as per the requirement. • Discuss how to identify six directional hazards at workplace and take decisions accordingly. • Discuss how to check that roof supporting is as per Systematic Support Plan (SSP) and approved Systematic Support Rules (SSR) while undertaking work in an area. • Discuss how to follow appropriate Standard Operating Procedure while working near any isolated and sealed off area of the mine. • List the different types of machineries used in U/G mines. • Throw light on provision of medical examination (IME & PME) of person employed as per Mines Rules 1955. • State the importance of first aid and hygiene. 	<ul style="list-style-type: none"> • Demonstrate how to operate various types of fire extinguishers to control different types of fire at a worksite when required. • Show how to use self-rescue apparatus, appropriately when required. • Read line diagram of ventilation circuit to identify the working ventilation district, to direct air to the working face.

- Explain how to take precaution against occupational health hazards (like dust, water, mine gases etc.) due to U/G working environment.
- Discuss duties and rights of workers, as well as the safety and occupational health policy of organization.
- Throw light on the selection process of person for rescue training.
- Cite about the isolation and sealed off area of the mine.
- Discuss the various problems/incidents likely to occur and precautions to be taken when handling heavy equipment.
- State the mine safety standard including illumination level, noise levels, dust level, pollutants, etc. at the work-site.
- List the common sources of pollution in the mines and ways to minimize it.
- Discuss how to follow process for reporting any unsafe act/condition in work area to the concerned person.
- Describe how to use underground mine communication system.
- Throw light on how to ensure positive isolation near the work place if applicable.
- Describe about the safety appliances and rescue equipment.
- State how to report any symptoms of illness to the shift-in-charge.
- Outline the role of Internal Safety Organisation, safety committee, workman's inspector and DGMS.
- Discuss the mining area-specific signs, and other safety and emergency signals and the outcome of violation of safety procedures.
- List the role and responsibilities of rescue room and rescue station and how to contact them in case of emergency.
- State the importance of taking shelter at the miner's station during blasting operation.
- Discuss about the safety equipment like safety shoes, safety belt, tight fit clothing, hand gloves, safety goggles, Gas Detector, Safety Lamp, Self-Contained Breathing Apparatus, gum boots, ear plugs, Face Mask, etc. and importance of FAB (Fresh Air Base).
- Describe shot-firing / blasting related safety regulations including taking shelter during blasting.

<ul style="list-style-type: none"> • Throw light on the emergency response /disaster management plan prepared by the organization as per DGMS guideline. • Explain the rules and regulations for safety and security while handling hazardous materials. • Outline the basic provisions in Mines Creche Rules, 1966 (MCR) for females employed in the mines. • Discuss the importance of sensitization towards different genders and persons with disabilities. (PWD). • Explain the importance of following infection control policies, '5-S' practices, and waste management. • Discuss the importance of water/material/energy conservation and management. • Discuss Safety Management Plan (SMP) and Emergency Management Plan (EMP). • Explain how to maintain hand hygiene by washing hands with alcohol based sanitisers/ soap. • Elucidate on how to maintain hygiene at the work site and disinfect the machine/tools before and after work/task. • Discuss the environmental impact of mining related operations and steps to reduce those impacts. • Throw light on the mineral conservation practices in U/G mining operations to achieve optimum ore or mineral recovery. • Explain how to ensure that stowing practices produce minimum disturbance to the surface. • Discuss how to ensure that the subgrade ore is carried out to surface and stacked separately at the earmarked place. • Explain how to ensure the productivity of the machine for material/fuel conservation. 	
Classroom Aids	
LCD Projector, Laptop/Computer with internet, White Board, Flip Chart, Markers	
Tools, Equipment and Other Requirements	
Helmet, gloves, harness, earplugs, Safety Goggles, Nose mask, Safety shoes, Fire extinguisher, Types of log book, First Aid box, MCDR, MCR, Company's SOP; Diagrams showing quarries, overhangs, fencing, etc.; samples of different types of rocks to be encountered; Mines Act; "5-S" Charts; Daily, Weekly, Monthly Maintenance/Defect sheets; Systematic Support Plan (SSP); Systematic Support Rules (SSR); self-rescue apparatus; Line Diagram of Ventilation Circuit; Alcohol based sanitisers; self-rescue apparatus; Gas Detector, Safety Lamp, Self-Contained Breathing Apparatus, gum boots; Diagrams of Armoured face conveyor; Charts of coal mines occupational diseases; CMR; MMR; MRR, Company's Safety Management Plan (SMP) and Emergency Management Plan (EMP)	

Module 5: Follow Health, Safety, and Environmental Guidelines for opencast mines

Mapped to MIN/N1703, v1.0

Terminal Outcomes:

- Discuss about the worksite health and safety measures and environmental guidelines.

Duration: 20:00	Duration: 50:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Explain how to comply with safety, health, and security-related regulations/guidelines at the open cast mine and safety instructions given by the workman's inspector. • Describe about various environmental awareness program related to mining, organized by the various government bodies/company. • Discuss how to follow adequate safety while working at haul roads, heights, overburden dumps, sump area, stockyard, near moving parts, etc. • Recall the safety precautions to be taken while working on sites (sub-station, workshop etc.), with equipment, and conducting welding and cutting operations. • Discuss how to follow appropriate Safe Operating Procedure (SOP) while dealing with explosives. • Illustrate how to respond promptly and appropriately to an accident/ incident or an emergency situation, within limits of the role and responsibility. • Discuss usage of appropriate PPE as per the requirement. • Explain how to maintain hand hygiene by washing hands with alcohol based sanitisers/soap. • Elucidate on how to maintain hygiene at the work site and disinfect the machine/tools before and after work/task. • State how to report any symptoms of illness to the shift-in-charge. • Discuss the safety guidelines specified by Directorate General of Mine Safety (DGMS). • List basic mining terminologies and definitions. • Explain about the means of access and egress from the mines, location of workshop, haul roads and working face including dump yards. 	<ul style="list-style-type: none"> • Show how to provide first aid to an injured person. • Display how to operate various types of fire extinguishers to control different types of fire at a worksite when required. • Role-play the situations on how to assist supervisor for reducing environmental impact caused due to related mining operations.

- Outline about the shot-firing / blasting related safety regulations including taking shelter during blasting.
- Discuss the duties of workers, working hours and accident compensation as per under The Mines act-1952.
- Throw light on the hierarchy of the reporting.
- Recall the proper documents specific to the machine.
- Discuss about the machine operation, condition of the machine and worksite.
- Throw light on various problems/ incidents and precautions to be taken when handling heavy equipment.
- Throw light on the environmental impact of related opencast mining operations.
- Discuss how to follow the process for collecting, storing and disposing of the hazardous material and waste (like used oil, lubricant, battery, etc.) in compliance with worksite guidelines.
- Explain the process of top soil removal and management and ensure not to mix topsoil with waste in day to day tasks.
- Discuss how to ensure that HEMM is washed at the designated location.
- Illuminate on how to ensure the productivity of the machine for material/fuel conservation.
- Discuss the mineral conservation practices specified by the organization in accordance with MCDR-2017 (Mineral Conservation and Development Rules).
- Discuss the role of workmen inspector, safety committee and internal safety organization.
- Throw light on the signage, mining area-specific signs, and other safety and emergency signals.
- State the outcome of violation of safety procedures.
- Summarise the importance of sensitization towards different genders and PWD (Persons with Disabilities).
- Throw light on mine sump and pumping system of the mines.
- State the mine safety standard including illumination level, noise levels, dust level, pollutants, etc. at the work-site.
- List the common sources of pollution in the mines and ways to minimize it.

<ul style="list-style-type: none"> • Enlist the safety equipment like safety shoes, safety belt, tight fit clothing, hand gloves, safety goggles, gas detector, safety lamp, self-contained breathing apparatus, gum boots, ear plugs, face mask, etc. • Discuss emergency response /disaster management plan prepared by the organization. 	
Classroom Aids	
LCD Projector, Laptop/Computer with internet, White Board, Flip Chart, Markers	
Tools, Equipment and Other Requirements	
Helmet, gloves, harness, earplugs, Safety Goggles, Nose mask, Safety shoes, Fire extinguisher, Types of log book, First Aid box, MCDR, MCR, Company's SOP; Diagrams showing quarries, overhangs, fencing, etc.; samples of different types of rocks to be encountered; Mines Act; "5-S" Charts; Daily, Weekly, Monthly Maintenance/Defect sheets; Systematic Support Plan (SSP); Systematic Support Rules (SSR); self-rescue apparatus; Line Diagram of Ventilation Circuit; Alcohol based sanitizers; self-rescue apparatus; Gas Detector, Safety Lamp, Self-Contained Breathing Apparatus, gum boots; Diagrams of Armoured face conveyor; Charts of coal mines occupational diseases; CMR; MMR; MRR, Company's Safety Management Plan (SMP) and Emergency Management Plan (EMP)	

Module 6: Follow Health, Safety, and Environmental guidelines for underground coal mines

Mapped to MIN/N1704, v1.0

Terminal Outcomes:

- Discuss about the worksite health and safety measures and environmental guidelines.

Duration: 20:00	Duration: 50:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • List the preventive measures against firedamp, white damp, blackdamp etc. • Explain how to undertake "The Take-5 (Personal Risk Assessment)" before commencement of any work (DGMS Tech. circulars 2/2014). • Discuss how to check that roof supporting is as per Systematic Support Plan (SSP) and approved Systematic Support Rules (SSR while undertaking work in an area. • Throw light on various types of gases available in the mine and their effects; and their control measures. • Discuss how to comply with safety, health and security-related regulations/guidelines at the mine e.g. SOP for material handling in underground (U/G) mine. • Describe how to ensure that oil, grease, canvas or other inflammable material are stored in fire-proof receptacle. • List the safety precautions to be followed against spontaneous heating of the coal. • Discuss how to ensure that no person is traveling/ working/ staying under unsupported roof. • Throw light on how to take precaution against occupational health hazards (like dust, water, mine gases etc.) due to U/G working environment. • Discuss Safety Management Plan (SMP) and Emergency Management Plan (EMP) and precautions against U/G electrical appliances. • Discuss the safety guidelines specified by Directorate General of Mine Safety (DGMS) and selection process of person for rescue training. • Elucidate on how to take proper care against damage and accidents while loading, transporting, dismantling and erecting of roof supports. 	<ul style="list-style-type: none"> • Show how to use the flame safety lamp for detecting the methane gas as per Standard Operating Procedure (SOP). • Demonstrate how to operate various types of fire extinguishers to control different types of fire at worksite, if required. • Display how to use self-rescue apparatus appropriately when required. • Read the line diagram of ventilation circuit to identify the working ventilation district to direct air to the working face. • Apply appropriate techniques to ensure that every instrument, apparatus and equipment are DGMS approved before these are used. • Demonstrate how to ensure that Armoured face conveyor (AFC) and chocks must be kept in straight line for every cycle of operations and tightened up to the setting pressure while keeping it in full contact with the roof, applicable for long wall mining. • Show how to provide first aid to an injured person. • Role-play the situations on how to report any symptoms of illness to the shift in-charge.

- Throw light on how to follow appropriate SOP while working near any isolated and sealed off area of the mine.
- Discuss the provision of medical examination (Initial Medical Examination (IME) & Periodical Medical Examination (PME)) of a person employed, as per Mines Rules 1955.
- List different types of machineries used in U/G mines.
- Enlist different types of supporting system used in U/G mines as per SSP and SSR.
- Cite precautions to be taken when handling heavy equipment.
- Discuss how to ensure that the roof and sidewalls of the mine face (or newly exposed area of the mines) have been scaled/ dressed properly.
- List relevant safety precautions to be taken during depillaring operation in UCM.
- Recall the safety precautions to be followed while traveling on U/G haul roads, in case of post blast fumes and misfire.
- Discuss the manufacturer's instructions for care and safe operation of mine machinery and equipment.
- Throw light on the laid out SOP in case of alarm signal for leakage of inflammable gases.
- Explain the process of reporting any unsafe act/condition in the working area to the concerned person.
- Discuss how to use underground mine communication system.
- Elucidate how to ensure positive isolation near the work place if applicable.
- Discuss how to use appropriate Personal Protective Equipment (PPE) as per the requirement and safety equipment.
- Explain how to maintain hand hygiene by washing hands with alcohol based sanitisers/soap, disinfect the machine/tools before and after work/task and maintain hygiene at the work site.
- Discuss how to identify six directional hazards at workplace and take decisions accordingly.
- Discuss the environmental impact of mining related operations and steps to reduce those impacts.
- Throw light on the mineral conservation practices in U/G mining operations to achieve optimum ore or mineral recovery.

- Describe how to ensure that the stowing practices produce minimum disturbance to the surface.
- Summarize how to ensure that the subgrade coal is carried out to surface and stacked separately at the earmarked place.
- Throw light on how to ensure the productivity of the machine for material/fuel conservation.
- Outline the process for collecting, storing and disposing of the hazardous material and waste (like used oil, lubricant, battery, etc.) in compliance with worksite guidelines.
- Discuss the "5-S" practice at work site like cleaning oil from ground (to avoid soil from getting damaged), etc.
- Discuss the duties and rights of workers.
- List the various problems/incidents likely to occur.
- Throw light on the role of Internal Safety Organization, safety committee, workman's inspector and DGMS.
- State mine safety standard including light illumination level, noise levels, dust level, pollutants, etc. at the work-site.
- List common sources of pollution in the mines and ways to minimize it.
- Discuss shot-firing / blasting related safety regulations including taking shelter during blasting.
- Recall mining area-specific signs, and other safety and emergency signals.
- Discuss the outcome of violation of safety procedures.
- List safety appliances and rescue equipment.
- Discuss the safety and occupational health policy of organization.
- Explain the importance of FAB (Fresh Air Base).
- State basic provisions in Mines Creche Rules, 1966 (MCR) for any females employed in the mines.
- Discuss about basic safety regulations of Coal Mines Regulation, 2017 (CMR).
- List types of stone dust barrier and its importance.
- Explain coal dust explosion and its preventive measures.
- Outline the classification of coal mines as per the degree of gassiness of coal seams such as

<p>first degree, second degree, and third-degree mines.</p> <ul style="list-style-type: none"> • List the precautions as per the gassiness of the coal mines. • Discuss about coal mines occupational disease such as pneumoconiosis or 'black lung' and their preventive measures. • List the roles, duties and responsibilities of rescue team members, rescue room and rescue station and how to contact them in case of emergency. • Enlist the correct steps for conducting any rescue work as per Mine Rescue Rule (MRR). • Summarize the importance of sensitization towards different genders and persons with disabilities (PWD). • Discuss the importance of waste management, hazardous material safety, security rules and regulations. • Throw light on importance of water/material/energy conservation and management. 	
<p>Classroom Aids</p>	
<p>LCD Projector, Laptop/Computer with internet, White Board, Flip Chart, Markers</p>	
<p>Tools, Equipment and Other Requirements</p>	
<p>Helmet, gloves, harness, earplugs, Safety Goggles, Nose mask, Safety shoes, Fire extinguisher, Types of log book, First Aid box, MCDR, MCR, Company's SOP; Diagrams showing quarries, overhangs, fencing, etc.; samples of different types of rocks to be encountered; Mines Act; "5-S" Charts; Daily, Weekly, Monthly Maintenance/Defect sheets; Systematic Support Plan (SSP); Systematic Support Rules (SSR); self-rescue apparatus; Line Diagram of Ventilation Circuit; Alcohol based sanitisers; self-rescue apparatus; Gas Detector, Safety Lamp, Self-Contained Breathing Apparatus, gum boots; Diagrams of Armoured face conveyor; Charts of coal mines occupational diseases; CMR; MMR; MRR, Company's Safety Management Plan (SMP) and Emergency Management Plan (EMP)</p>	

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training Experience		Remarks
		Years	Specialization	Years	Specialization	
Class X	NA	6	Relevant experience required as Mine Shotfirer/Blaster.	NA	-	-
OR						
ITI	NA	6	Relevant experience required as Mine Shotfirer/Blaster.	NA	-	-
OR						
Diploma	Mining Engineering	5	Relevant experience required as Mine Shotfirer/Blaster.	NA	-	-
OR						
B-Tech	Mining Engineering	4	Relevant experience required as Mine Shotfirer/Blaster.	NA	-	-

Trainer Certification	
Domain Certification	Platform Certification
MIN/Q1302, v2.0 Mine Shotfirer/Blaster. Minimum accepted score as per SSC guideline is 80%.	MEP/Q2601, v2.0 Trainer (VET and Skills). Minimum accepted score as per SSC guideline is 80%.

Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training/Assessment Experience		Remarks
		Years	Specialization	Years	Specialization	
Class X	NA	8	Relevant experience required as Mine Shotfirer/Blaster.	NA	-	-
OR						
ITI	NA	8	Relevant experience required as Mine Shotfirer/Blaster.	NA	-	-
OR						
Diploma	Mining Engineering	7	Relevant experience required as Mine Shotfirer/Blaster.	NA	-	-
OR						
B-Tech	Mining Engineering	6	Relevant experience required as Mine Shotfirer/Blaster.	NA	-	-

Assessor Certification	
Domain Certification	Platform Certification
MIN/Q1302, v2.0 Mine Shotfirer/Blaster. Minimum accepted score as per SSC guideline is 80%.	MEP/Q2701, v2.0 Assessor (VET and Skills). Minimum accepted score as per SSC guideline is 80%.

Assessment Strategy

Assessment system Overview:

Assessment will be carried out by SCMS affiliated assessment partners. Based on the results of assessment, SCMS certifies the learners. Candidates have to pass online theoretical assessment which is approved by SCMS.

The assessment will have both theory and practical components in 30:70 ratios.

While theory assessment is summative and an online written exam; practical will involve demonstrations of applications and presentations of procedures and other components. Practical assessment will also be summative in nature.

Testing Environment:

Training partner has to share the batch start date and end date, number of trainees and the job role.

Assessment is fixed for a day after the end date of training. It could be next day or later. Assessment will be conducted at the training venue.

Question bank of theory and practical will be prepared by assessment agency and approved by SCMS. From this set of questions, assessment agency will prepare the question paper. Theory testing will include multiple choice questions, pictorial question, etc. which will test the trainee on theoretical knowledge of the subject.

The theory and practical assessments will be carried out on same day. If number of candidates are many, more assessors and venue will be organized on same day of the assessment.

Assessment			
Assessment Type	Formative or Summative	Strategies	Examples
Theory	Summative	Written Examination	Knowledge of facts related to the job role and functions. Understanding of principles and concepts related to the job role and functions
Practical	Summative	Structured tasks	Presentation
Viva	Summative	Questioning and Probing	Mock interview on topics

Assessment Quality Assurance framework

Only certified assessor can be assigned for conducting assessment. Provision of 100 % video recording with clear audio to be maintained and the same is to be submitted to SCMS.

The training partner will intimate the time of arrival of the assessor and time of leaving the venue.



Methods of Validation: -

Unless the trainee is registered, the person cannot undergo assessment. To further ensure that the person registered is the person appearing for assessment, id verification will be carried out. Aadhar card number is required of registering the candidate for training. This will form the basis of further verification during the assessment. Assessor conducts the assessment in accordance with the assessment guidelines and question bank as per the job role. The assessor carries tablet with the loaded questions. This tablet is geo tagged and so it is monitored to check their arrival and completion of assessment. Video of the practical session is prepared and submitted to SCMS. Random spot checks/audit are conducted by SCMS assigned persons to check the quality of assessment. Assessment agency will be responsible to put details in SIP.

SCMS will also validate the data and result received from the assessment agency.

Method of assessment documentation and access

The assessment agency will upload the result of assessment in the portal. The data will not be accessible for change by the assessment agency after the upload. The assessment data will be validated by SCMS assessment team. After upload, only SCMS can access this data. SCMS approves the results within a week and uploads on SIP.

References

Glossary

Term	Description
Declarative Knowledge	Declarative knowledge refers to facts, concepts and principles that need to be known and/or understood in order to accomplish a task or to solve a problem.
Key Learning Outcome	Key learning outcome is the statement of what a learner needs to know, understand and be able to do in order to achieve the terminal outcomes. A set of key learning outcomes will make up the training outcomes. Training outcome is specified in terms of knowledge, understanding (theory) and skills (practical application).
OJT (M)	On-the-job training (Mandatory); trainees are mandated to complete specified hours of training on site
OJT (R)	On-the-job training (Recommended); trainees are recommended the specified hours of training on site
Procedural Knowledge	Procedural knowledge addresses how to do something, or how to perform a task. It is the ability to work, or produce a tangible work output by applying cognitive, affective or psychomotor skills.
Training Outcome	Training outcome is a statement of what a learner will know, understand and be able to do upon the completion of the training .
Terminal Outcome	Terminal outcome is a statement of what a learner will know, understand and be able to do upon the completion of a module . A set of terminal outcomes help to achieve the training outcome.

Acronyms and Abbreviations

Term	Description
QP	Qualification Pack
NSQF	National Skills Qualification Framework
NSQC	National Skills Qualification Committee
NOS	National Occupational Standards
RE	Rare Earths
SIP	Skill India Portal
SOP	Standard Operating Procedure
SCMS	Skill Council for Mining Sector