



Model Curriculum

QP Name: Heavy Earth Moving Machinery (HEMM) Mechanic
Underground Metal/ Opencast/ Underground Coal

QP Code: MIN/Q3202

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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Table of Contents

Table of Contents.....	2
Training Parameters.....	3
Program Overview.....	4
Training Outcomes.....	4
Compulsory Modules.....	4
Elective Modules - (mandatory to select at least one)	5
Module Details.....	7
Module 1: Introduction to the Job Role of HEMM Mechanic.....	7
Module 2: Diagnose HEMM for repair requirement.....	8
Module 3: Carry out service, repair and maintenance activities.	11
Employability Skills (60 Hours)	14
Module 4: Health, Safety and Environmental Guidelines for Underground Metalliferous Mines ...	18
Module 5: Health, Safety, and Environmental Guidelines for opencast mines.....	22
Module 6: Health, Safety, and Environmental Guidelines underground coal mines.....	25
Annexure.....	30
Trainer Requirements	30
Assessor Requirements.....	31
Assessment Strategy.....	32
References.....	34
Glossary.....	34
Acronyms and Abbreviations	34

Training Parameters

Sector	Mining
Sub-Sector	Engineering Services
Occupation	Mechanical Services
Country	India
NSQF Level	4
Aligned to NCO/ISCO/ISIC Code	NCO-2015/7233.1500
Minimum Educational Qualification and Experience	8th grade pass plus 2-year NTC plus 1 Year NAC OR 8th pass plus 1-year NTC plus 1-Year NAC plus CITS OR 10th grade pass and pursuing continuous schooling OR 10th grade pass with 2 years relevant experience OR Previous relevant Qualification (Jr. HEMM Mechanic) of NSQF Level 3.0 with minimum education as 5th Grade pass with 2 years relevant experience
Pre-Requisite License or Training	Preferable Heavy Motor Vehicle Driving License
Minimum Job Entry Age	20 years
Last Reviewed On	27/01/2022
Next Review Date	27/01/2025
NSQC Approval Date	27/01/2022
QP Version	2.0
Model Curriculum Creation Date	27/01/2022
Model Curriculum Valid Up to Date	27/01/2025
Model Curriculum Version	2.0
Minimum Duration of the Course	450 hours
Maximum Duration of the Course	450 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:

- Demonstrate how to diagnose HEMM for repair requirement.
- Demonstrate how to carry out service, repair and maintenance activities.
- Discuss Health, Safety, and Environmental guidelines for Underground Metalliferous Mines (UMM), Opencast Mines and 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(s)	10:00	00:00	00:00	-	10:00
Module 1: Introduction to the Job role of HEMM Mechanic	10:00	00:00	00:00	-	10:00
MIN/N3206-Diagnose HEMM for repair requirement. NOS Version No. 1.0 NSQF Level - 4	20:00	30:00	60:00	-	110:00
Module 2: Diagnose HEMM for repair requirements	20:00	30:00	60:00	-	110:00
MIN/N3207-Carry out service, repair and maintenance activities NOS Version No. 1.0 NSQF Level - 4	30:00	90:00	60:00	-	180:00
Module 3: Carry out service, repair and maintenance activities	30:00	90:00	60:00	-	180:00
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	84:00	156:00	120:00	-	360:00

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) <i>NOS Version No. 1.0</i> NSQF Level- 4	30:00	30:00	30:00	-	90:00
Module 4: Health, Safety, and Environmental guidelines for Underground Metalliferous Mines	30:00	30:00	30:00	-	90:00
Total Duration	30:00	30:00	30:00	-	90:00

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
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MIN/N1703-Follow Health, Safety, and Environmental Guidelines for opencast mines (Including Mine Vocational Training Rule) NOS Version No. 1.0 NSQF Level- 4	30:00	30:00	30:00	-	90:00
Module 5: Health, Safety, and Environmental Guidelines for opencast mines	30:00	30:00	30:00	-	90:00
Total Duration	30:00	30:00	30:00	-	90:00

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) NOS Version No. 1.0 NSQF Level- 4	30:00	30:00	30:00	-	90:00
Module 6: Health, Safety, and Environmental Guidelines for underground coal mines	30:00	30:00	30:00	-	90:00
Total Duration	30:00	30:00	30:00	-	90:00

Module Details

Module 1: Introduction to the Job Role of HEMM Mechanic

Bridge Module

Terminal Outcomes:

- Discuss the scope of mining industry
- Explain the role and responsibility of the HEMM Mechanic

Duration: 10:00	Duration: 00:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> ● Describe the concept of Opencast Mining and Underground Mining Operations ● Explain the characteristic features of Metal mines and Coal Mines ● Discuss Regulatory context specified to work in Mines ● Recall the roles and responsibilities of HEMM Mechanic. 	
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: Diagnose HEMM for repair requirements

Mapped to MIN/N3206, v1.0

Terminal Outcomes:

- Demonstrate how to identify and diagnose operational faults.

Duration:20:00	Duration:30:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Discuss the job-specific documents e.g. daily maintenance checklist. • Explain the risk and impact of not following defined procedures/work instructions. • State the hierarchy for reporting identified problems. • Discuss original equipment manufacturers' specifications and standard operating procedure set out for preventive maintenance and diagnosing faults. • Discuss the impact of damaged equipment on the company. • Illuminate on the implications of delays in process. • Discuss hand over and take over procedures of the machine according to company's SOP. • Summarize the safety guidelines specified by Directorate General of Mines Safety (DGMS) specific to HEMM Mechanic operations. • Discuss the different types of mines and detail of the mine one is working in. • Describe benching in quarries, dressing of overhangs, undercuts, fencing. • Summarize the importance of first aid and hygiene. • State the code of practice in specific areas of the mine. • Discuss the standing orders in force at the mine and the importance of safety in the vicinity of machinery. • Discuss about shot-firing / blasting related safety regulations including taking shelter during blasting. • Discuss about the duties of workmen, provision of compensation and working hours, leaves, etc. under the Mines Act-1952. 	<ul style="list-style-type: none"> • Demonstrate how to conduct scheduled, routine examination methods and assessments against Equipment specifications to identify wear, damage, corrosion, inadequate fluid levels, leaks, wear, security problems and general condition and serviceability. • Show how to review complaint sheet, logbook and history sheet of the equipment and identify repair requirements. • Display how to use diagnostic procedures as defined in the troubleshooting checklist prepared by the equipment manufacturer. • Display how to use the diagnostic tools as required to assess the problem including using on board diagnostic tools like digital tools and devices, use of pressure gauges, filler gauges, callipers and condition monitoring devices and tools to obtain equipment data and compare the same with standards to detect faults in the system. • Apply appropriate techniques to check and make adjustments to clearances, gaps, settings, alignment, pressures, tension, speeds and oil levels relevant to the engine area, transmission area, chassis area, final drive, electrical circuitry and body (including valves, ignition, fuel system and emissions, brakes, transmission, lights, final drive, hydraulic system, tyres/tracks, steering and body and chassis fittings). • Demonstrate how to check routine service components and materials, including oil seals, filters, drive belts, wiper blades, brake linings and pads, linkages, bearings, lubricants and fluids.

- Throw light on the outcome of violation of safety procedures.
- Discuss the emergency response /disaster management plan prepared by the organization.
- Illuminate on the basic technology used in and functioning of various components and aggregates of the Equipment including engines and fuel system, cooling system, air supply systems, emission and exhaust system, ignition systems, clutch assembly, clutch operating system, gearbox (manual and automatic) / transmission, torque converter, drivelines and hubs, drive-train assembly and transmission systems (manual, automatic etc.), steering system, suspension system, brake system, tyres and wheels (including wheel alignment), tracks and power train up to final drive, in case of crawling equipment, batteries and power storage system, power-generating/transmission systems (including charging and interlocking systems), electrical wire harness, lighting, ignition, electronic and air-conditioning systems, electronic systems including active and passive safety, electronic control unit. hydraulic and pneumatic systems, various lubrication systems.
- Discuss about the tools used to assess and confirm technical faults that cannot be determined through a visual inspection, including use of (but not limited to) pressure indicators: fuel pressure testers, manifold gauge sets, oil pressure gauges, tyre pressure gauges, measuring equipment (Vernier callipers, micrometre, feeler gauges, multi-meter, flow meter, temp gauge, dial gauge etc.), condition Monitoring Systems for temperature, vibration, sound etc.
- Throw light on the various sources of information available for assessing service and repair requirements of the vehicle including diagnostic displays, visual inspections, test drives, vehicle/equipment manufacturer specifications, standard operating procedures
- Demonstrate how to recognise and record any damage to equipment's components and units outside normal service items.
- Show how to check lubricant levels and identify codes and grades of lubricants to be used for specific components of HEMM.
- Apply appropriate techniques to dismantle specific components and assemblies, needing attention, to locate and identify faults.
- Role-play the situation to report malfunctions or repair requirements observed in equipment's beyond what is mentioned in the complaint sheet.

<p>for diagnosis, equipment log books and history sheets, complaint register / sheet.</p>	
<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>PPTs of different types of mines, Charts showing the same, Engines of HEMM equipment (Shovel & Dump-truck), Transmissions of HEMM equipment, Tools & tackles for repairs, Lathe machine, Tyre equipment, Undercarriages of tracked equipment, 5 tonne crane, Allen Key set of 12 pieces, Calliper inside 15 cm Spring, Callipers outside 15 cm spring, Centre Punch 10 mm. Dia. x 100 mm., Electrician Screw Driver 250 mm, Hammer ball peen 0.5 kg with handle, Pliers combination 20 cm., Screw driver 20cm.X 9mm. Blade, Scriber 15 cm, Spanner, ring set of 12 metric sizes 6 to 32 mm, Spanner D.E. set of 12 pieces (6mm to 32mm), Spanners socket with speed handle, T-bar, ratchet and universal up to 32, Steel rule 30 cm inch and metric, Steel tool box with lock and key (folding type) 400x200x150 mm, Wire cutter and stripper, Gloves, Safety shoes, Safety goggles, Safety helmet, Fire extinguisher, Types of log book, First Aid box</p>	

Module 3: Carry out service, repair and maintenance activities

Mapped to MIN/ N3207, v1.0

Terminal Outcomes:

- Demonstrate how to carry out service, repair and maintenance activities

Duration:30:00	Duration:90:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> ● Discuss job-specific documents e.g. daily maintenance checklist. ● Throw light on OEM recommended procedure and checklist for routine servicing. ● Throw light on the risk and impact of not following defined procedures/work instructions. ● Discuss how to confirm tasks to be carried out with superior for non-routine service or repair. ● State the hierarchy for reporting identified problems. ● Explain how to obtain the correct spare parts, lubricants, tools and other materials required. ● Discuss the impact of damaged equipment on the company. ● Illuminate on the implications of delays in the process. ● Discuss hand over and take over procedures of the machine according to company's SOP. ● Explain how to ensure disposal of materials in accordance with the organization's policies. ● Summarize the safety guidelines specified by Directorate General of Mines Safety (DGMS) specific to HEMM mechanic. ● Discuss the different types of mines and detail of the mine one is working in. ● List the various precautions to be taken to avoid damage to the vehicle and its components. ● Describe benching in quarries, dressing of overhangs, undercuts, fencing. ● Summarize the importance of first aid and hygiene. ● Explain how to follow standard operating procedures for using workshop tools and equipment. 	<ul style="list-style-type: none"> ● Apply appropriate procedure to calibrate, align and adjust settings, alignment, pressures, tension, speeds and levels relevant to engine and aggregates, transmission system, load bearing arms and structure, safety devices and components installed, electrical and electronic components and other components (including valves, ignition, fuel systems and emissions, brakes, transmission, lights, tyres, tracks, hydraulic systems, steering and body/chassis fittings) ● Display how to identify and change components requiring change due to continuous wear and tear including fuel, oil and air filters, drive belts, braking system components, drive train components, oil seals, bearings and bushes etc. ● Show how to refill correct grade of coolants, lubricants and other fluids as per OEM guidelines. ● Demonstrate how to record all service and repairs carried out and ensure completeness of tasks assigned before releasing vehicle for the next procedure.

- Discuss how to ensure workshop tools, equipment and workstations are adequately maintained by carrying out scheduled checks, calibration and timely repairs.
- Cite the code of practice in specific areas of the mine and.
- Through light on how to ensure all workshop tools, equipment and workstations are adequately maintained by carrying out scheduled checks, calibration and timely repairs.
- Summarize the standing orders in force at the mine and the importance of safety in the vicinity of machinery.
- Discuss about shot-firing / blasting related safety regulations including taking shelter during blasting.
- Discuss about the duties of workmen, provision of compensation and working hours, leaves, etc. under the Mines Act-1952.
- Through light on the outcome of violation of safety procedures.
- Discuss the emergency response /disaster management plan prepared by the organization.
- Illuminate on the basic technology used in and functioning of various components and aggregates of the Equipment including engines and fuel system (diesel, petrol, electrical etc.), cooling system, air supply systems, emission and exhaust system, ignition systems, clutch assembly, clutch operating system, gearbox (manual and automatic), drivelines and hubs, drive-train assembly and transmission systems (manual, automatic etc.), steering system, suspension system, braking system, tyres and wheels.
- Describe how to select the standard materials for the job such as seals, sealants, fittings, gaskets, joints, fasteners etc. as per manufacturers specification.
- Discuss how to carry out routine maintenance including checking vehicle condition against OEM specifications to identify damage, corrosion, wear and tear, fluid levels, leaks,

<p>make adjustments to settings, alignment, pressures, tension, speeds and levels relevant to engine and aggregates, steering system, clutch and brake assembly, transmission system, wheels and axle or track system, electrical and electronic components, other components and other problems in serviceability.</p> <ul style="list-style-type: none"> ● State the type and quality of components specified by the OEM for use as replacement parts. ● Throw light on the grade of lubricants specified by the OEM for use. ● Explain the typical causes and symptoms of operational faults and failures of a vehicle corrective action to be taken for common engine and aggregate system faults and failures. ● Describe the faults and failures that necessitate replacement of components and other units. ● Explain how to dispose off replaced components in accordance with safety, health and environmental policies and regulations. 	
<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>PPTs of different types of mines, Charts showing the same, Engines of HEMM equipment (Shovel & Dump-truck), Transmissions of HEMM equipment, Tools & tackles for repairs, Lathe machine, Tyre equipment, Undercarriages of tracked equipment, 5 tonne crane, Allen Key set of 12 pieces, Calliper inside 15 cm Spring, Callipers outside 15 cm spring, Centre Punch 10 mm. Dia. x 100 mm., Electrician Screw Driver 250 mm, Hammer ball peen 0.5 kg with handle, Pliers combination 20 cm., Screw driver 20cm.X 9mm. Blade, Scriber 15 cm, Spanner, ring set of 12 metric sizes 6 to 32 mm, Spanner D.E. set of 12 pieces (6mm to 32mm), Spanners socket with speed handle, T-bar, ratchet and universal up to 32, Steel rule 30 cm inch and metric, Steel tool box with lock and key (folding type) 400x200x150 mm, Wire cutter and stripper, Gloves, Safety shoes, Safety goggles, Safety helmet, Fire extinguisher, Types of log book, First Aid box</p>	

Employability Skills (60 Hours)

Mapped to DGT/VSQ/N0102, v1.0

<i>Key Learning Outcomes</i>	
Introduction to Employability Skills	Duration: 1.5 Hours
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 11. Create a career development plan with well-defined short- and long-term goals 	
Communication Skills	Duration: 5 Hours
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 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
<ol style="list-style-type: none"> 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
Certified in 60-hour Employability NOS (2022), with a minimum score of 80% OR Certified in 120-, 90-hour Employability NOS (2022), with a minimum score of 80%	MEP/Q2601, v2.0 Trainer (VET and Skills). Minimum accepted score as per SSC guideline is 80%.

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	Prospective ES Master trainer should: <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
Certified in 60-hour Employability NOS (2022), with a minimum score of 90% . OR Certified in 120-, 90-hour Employability NOS (2022), with a minimum score of 90%	MEP/Q2602, v2.0 Master Trainer (VET and Skills). Minimum accepted score as per SSC guideline is 90%.

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:

- 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).
- Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/ training center based on these criteria.

Module 4: 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:30:00	Duration:30:00
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. 	<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.

- 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.
- 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.
- 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. (

<ul style="list-style-type: none"> ● 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: 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:30:00	Duration:30:00
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. 	<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.

- Explain about the means of access and egress from the mines, location of workshop, haul roads and working face including dump yards.
- 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 signages, 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).

<ul style="list-style-type: none"> ● 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. ● 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. 	
<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>	

Module 6: Health, Safety, and Environmental Guidelines underground coal mines

Mapped to MIN/N1704, v1.0

Terminal Outcomes:

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

Duration:30:00	Duration:30:00
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. 	<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.

- 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.
- 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, incase 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.
- Summarise 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 organisation.
- 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 first degree, second degree, and third-degree mines.
- 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.

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)

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 HEMM Mechanic	NA	-	-
OR						
ITI	Motor Vehicle Mechanic/ fitter/ automobile/ any relevant trades	6	Relevant experience required as HEMM Mechanic	NA	-	-
OR						
Diploma	Mechanical/ Automobile/ any relevant trades	5	Relevant experience required as HEMM Mechanic	NA	-	-
OR						
B-Tech	Mechanical/ Automobile/ any relevant trades	4	Relevant experience required as HEMM Mechanic	NA	-	-
OR						
CITS-NCIC	Mechanic Machine Tool, Maintenance (MMTM)	1	Relevant experience in mining	NA	-	-

Trainer Certification	
Domain Certification	Platform Certification
MIN/Q3202, v2.0 HEMM Mechanic. 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

Trainer Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training Experience		Remarks
		Years	Specialization	Years	Specialization	
Class X	NA	8	Relevant experience required as HEMM Mechanic	NA	-	-
OR						
ITI	Motor Vehicle Mechanic/ fitter/ automobile/ any relevant trades	8	Relevant experience required as HEMM Mechanic	NA	-	-
OR						
Diploma	Mechanical/ Automobile/ any relevant trades	7	Relevant experience required as HEMM Mechanic	NA	-	-
OR						
B-Tech	Mechanical/ Automobile/ any relevant trades	6	Relevant experience required as HEMM Mechanic	NA	-	-
OR						
CITS-NCIC	Mechanic Machine Tool, Maintenance (MMTM)	1	Relevant experience in mining	NA	-	-

Assessor Certification	
Domain Certification	Platform Certification
MIN/Q3202, v2.0 HEMM Mechanic. 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 ratio.

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 geotagged 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 is 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