



Model Curriculum

Mobile Equipment Maintenance

SECTOR: IRON & STEEL
**SUB-SECTOR: STEEL, SPONGE IRON, FERRO ALLOYS,
RE-ROLLERS, REFRACTORY**
OCCUPATION: MECHANICAL MAINTENANCE
REF ID: ISC/Q0907
NSQF LEVEL: 3



  

Certificate

**CURRICULUM COMPLIANCE TO
QUALIFICATION PACK – NATIONAL OCCUPATIONAL
STANDARDS**

is hereby issued by the
INDIAN IRON AND STEEL SECTOR SKILL COUNCIL
for the
MODEL CURRICULUM

Complying to National Occupational Standards of
Job Role/ Qualification Pack: 'Mobile Equipment Maintenance' QP No. 'ISC/Q0907 NSQF Level 3'

Date of Issuance: **December 22nd, 2015**
Valid up to: **December 21st, 2016**

** Valid up to the next review date of the Qualification Pack*


Authorised Signatory
(Indian Iron and Steel Sector Skill Council)



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Mobile Equipment Maintenance

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a “Mobile Equipment Maintenance”, in the “Iron & Steel” Sector/Industry and aims at building the following key competencies amongst the learner.

Program Name	Mobile Equipment Maintenance		
Qualification Pack Name & Reference ID.	Mobile Equipment Maintenance ISC/Q0907		
Version No.	1.0	Version Update Date	01-04-2017
Pre-requisites to Training	Minimum qualification – 8th Pass		
Training Outcomes	After completing this programme, participants will be able to: <ul style="list-style-type: none"> • Understand the assigned job of mobile equipment (light, medium, heavy and mobile crane) maintenance • Prepare for operation for mobile equipment (light, medium, heavy and mobile crane) maintenance • Carry out the assigned operation of mobile equipment (light, medium, heavy and mobile crane) maintenance • Use basic health and safety practices at the work place • Works effectively with others 		

This course encompasses 5 out of 5 National Occupational Standards (NOS) of “Mobile Equipment Maintenance” Qualification Pack issued by “Indian Iron & Steel Sector Skill Council”.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	Over view of Iron & Steel Industry Theory Duration (hh:mm) 04:00 Practical Duration (hh:mm) 00:00 Corresponding NOS Code	<ul style="list-style-type: none"> • Understanding Iron & steel industry • Understanding types of Iron & Steel Industry • Understanding products of Iron & Steel industry • Activities in Iron & Steel Industry 	PPTs of Iron and steel manufacturing, Charts showing the same
2	Occupational, Health and Safety (OHAS) Theory Duration	<ul style="list-style-type: none"> • Understanding the Occupational health & Safety • Understand What is hazard • Documentation for Health and safety 	PPTs for OHAS related to Job Role, Display Material for PPEs

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	(hh:mm) 08:00 Practical Duration (hh:mm) 12:00 Corresponding NOS Code ISC/N0008	<ul style="list-style-type: none"> Working at Heights, confined spaces Remedies for fire at work place 	related to Job Role, Safety Material
3	5S & House keeping Theory Duration (hh:mm) 06:00 Practical Duration (hh:mm) 06:00 Corresponding NOS Code ISC/N0008	<ul style="list-style-type: none"> Identification of bottlenecks in functioning of work place Various methods of housekeeping both pre-work & post-work as well 	PPTs of 5S, Display Charts of 5S, Audit Checklists of 5S
4	Understands the assigned job of mobile equipment (light, medium, heavy and mobile crane) maintenance Theory Duration (hh:mm) 25:00 Practical Duration (hh:mm) 70:00 Corresponding NOS Code ISC/N0932	<ul style="list-style-type: none"> Understand the assigned job in accordance with the instructions / checklist /maintenance manual Understand the circuit diagram Seek clarifications with respect to the equipment, maintenance manual Identify the tools and tackles that are required to carry out the assigned job of mobile equipment maintenance 	PPTs for various types of drawings, cylinders, valve accessories, cylinder block, cylinder liner, crank shaft, cam shaft, timing gear, piston, piston ring, piston pin, connecting rod, engine, gear box, lubrication system, fuel system, cooling system, accessories and electrical system
5	Prepare for operation for mobile equipment (light, medium, heavy and mobile crane) maintenance Theory Duration (hh:mm) 28:00 Practical Duration (hh:mm)	<ul style="list-style-type: none"> Reach the site and inspect the equipment for scheduled maintenance or defects and identify cause of problem Prepare spares, material required for operation for mobile equipment (light, medium, heavy and mobile crane) maintenance 	Cylinders, valve accessories, cylinder block, cylinder liner, crank shaft, cam shaft, timing gear, piston, piston ring, piston pin, connecting rod, engine, gear



Sr. No.	Module	Key Learning Outcomes	Equipment Required
	75:00 Corresponding NOS Code ISC/N0933		box, lubrication system, fuel system, cooling system, accessories and electrical system
6	Carry out the operation of mobile equipment (light, medium, heavy and mobile crane) maintenance Theory Duration (hh:mm) 30:00 Practical Duration (hh:mm) 80:00 Corresponding NOS Code ISC/N0934	<ul style="list-style-type: none"> Conduct routine maintenance or rectify the problem, as appropriate Check the oil level, lubrication system, cooling system, accessories, electrical system, belt drives etc. as per norms pre start Check oil pressure, temperature, break, light etc. start-up parameters post start Performance test and trouble shooting Conduct tests to ensure fitness Communicate to supervisor about completion of work 	Cylinders, valve accessories, cylinder block, cylinder liner, crank shaft, cam shaft, timing gear, piston, piston ring, piston pin, connecting rod, engine, gear box, lubrication system, fuel system, cooling system, accessories and electrical system
7	Use basic health and safety practices at the workplace Duration (hh:mm) 04:00 Practical Duration (hh:mm) 10:00 Corresponding NOS Code ISC/N0008	<ul style="list-style-type: none"> Health and safety procedures Fire safety procedures Emergencies, rescue and first aid procedures 	PPE, Different Type of Safety Sign, First Aid Box, Safety instrument and clothing, Step Ladder, Sample Accident reports, Fire Extinguishers, Items required for fire extinguisher and fire Safety
8	Work effectively with others Duration (hh:mm) 08:00 Practical Duration (hh:mm) 12:00 Corresponding NOS Code ISC/N0009	<ul style="list-style-type: none"> Ensure appropriate communication with superiors, peers and others as applicable at work place Demonstrate appropriate behaviour and etiquette at work place 	Communication skills PPTs, Posters Team management posters
	Total Duration	Unique Equipment Required:	



Sr. No.	Module	Key Learning Outcomes	Equipment Required
	Theory Duration 113:00 Practical Duration 265:00	<ul style="list-style-type: none">• Mechanical Drawings, Blueprints,• Basic Tools and Equipment's,• measuring tools & precision measurement tools,• Assembling tools Lubricant and coolant• Material and Equipment for cleaning, Bearing pulling, lifting machines• PPE, Safety Sign, First Aid Box, Fire Extinguishers	

Grand Total Course Duration: **378Hours, 0 Minutes**

(This syllabus/ curriculum has been approved by [Indian Iron and Steel Sector Skills Council](#))

Trainer Prerequisites for Job role: “Mobile Equipment Maintenance” mapped to Qualification Pack: “ISC/Q0907”

Sr. No.	Area	Details
1	Description	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack “ISC/Q0907”.
2	Personal Attributes	Aptitude for conducting training, and pre/ post work to ensure competent, employable candidates at the end of the training. Strong communication skills, interpersonal skills, ability to work as part of a team; a passion for quality and for developing others; well-organised and focused, eager to learn and keep oneself updated with the latest in the mentioned field.
3	Minimum Educational Qualifications	Min. ITI pass and preferably CTI/ATI cleared/ Diploma Mechanical
4a	Domain Certification	Certified for Job Role: “ <u>Mobile Equipment Maintenance</u> ” mapped to QP: “ISC/Q0907”. Minimum accepted score is 80%
4b	Platform Certification	Recommended that the Trainer is certified for the Job Role: “Trainer”, mapped to the Qualification Pack: “SSC/1402”. Minimum accepted score is 80%
5	Experience	Min. 5 years industry experience and minimum 2 years’ experience as Trained or un trained for same Job Role/ Trade



Annexure: Assessment Criteria

Assessment Criteria	
Job Role	Mobile Equipment Maintenance
Qualification Pack	ISC/Q0907
Sector Skill Council	Indian Iron & Steel Sector Skill Council

Sr. No.	Guidelines for Assessment
1	Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2	The assessment for the theory part will be based on knowledge bank of questions created by the SSC
3	Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training centre (as per assessment criteria below)
4	Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training centre based on these criteria.
5	To pass the Qualification Pack , every trainee should score a minimum of 60% in every NOS.
6	In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack.

Assessment outcome (nos)	Assessment criteria	Total marks	Out of	Marks allocation	
				Theory	Skills practical
ISC/N0932: Understands the assigned job of mobile equipment (light, medium, heavy and mobile crane) maintenance	PC1. Interpret the checklist/ manual and understand the maintenance job requirements	300	15	5	10
	PC2. Understand intake and exhaust system of the engine including cylinders, valve accessories, cylinder block, cylinder liner, crank shaft, cam shaft, timing gear, piston, piston ring, piston pin, connecting rod etc.		20	5	15
	PC3. Understand the lubrication system		20	5	15
	PC4. Understand the charging system		15	5	10
	PC5. Understand the braking system		15	5	10



Assessment outcome (nos)	Assessment criteria	Total marks	Out of	Marks allocation	
				Theory	Skills practical
	PC6. Understand the control system		15	5	10
	PC7. Plan, as appropriate to carry out the maintenance job		15	5	10
	PC8. Understand the circuit diagram		20	5	15
	PC9. Understand the symbols used in the circuit diagram		20	5	15
	PC10. Understand other specifications and identify the sequence of activities required to assemble the machine (engine, gear box, lubrication system, fuel system, cooling system, accessories and electrical system)		20	5	15
	PC11. Read and interpret maintenance manual to ensure correct limits, tolerance and fits of equipment components		20	5	15
	PC12. Identify any clarifications that he wants to seek with respect to the given maintenance manual of the mobile equipments (light, medium and heavy)		10	0	10
	PC13. Recognize whom to contact for clarifications on the circuit diagram		20	5	15
	PC14. Escalate the concern to the supervisor or shift-in-charge, if needed		20	5	15
	PC15. Identify tools, tackles and equipments (lifting equipment, various sizes of spanner, dial gauge, Vernier calliper, filler gauge, torque wrench etc.) required to perform the maintenance		20	5	15



Assessment outcome (nos)	Assessment criteria	Total marks	Out of	Marks allocation	
				Theory	Skills practical
	operation				
	PC16. Ask helper to carry tools required to the desired work site		15	5	10
	PC17. Report to stores / supervisor in case of non-availability of tools & tackles or stock-out		20	5	15
	NOS Total Marks	Total	300	75	225
ISC/N0933: Prepare for operation for mobile equipment (light, medium, heavy and mobile crane) maintenance	PC1. Reach the site with desired tools, tackles and equipment	150	10	0	10
	PC2. Plan for job duration and understand the process as per SOP		15	5	10
	PC3. Arrange necessary instruments to carry out maintenance (dial gauge, instrument and tools for dismantling and assembling e.g. spanners, torque wrench, power tools etc.)		20	5	15
	PC4. Identify the root cause of the problem, if any (problem that exists in engine, brake, lights, charging system, lubrication system etc.)		20	5	15
	PC5. Identify the causes of overheating of the engine		20	5	15
	PC6. Identify the spares as per parts catalogue		15	5	10
	PC7. Prepare the list of spares required for completion of maintenance job		15	5	10



Assessment outcome (nos)	Assessment criteria	Total marks	Out of	Marks allocation	
				Theory	Skills practical
	PC8. Ensure that tools match the desired specifications for maintenance		5	0	5
	PC9. Ensure tools and equipment required for assembly are free from physical damage and ready for maintenance operation		10	0	10
	PC10. Ensure measuring instruments e.g. Vernier, Micro meter, dial gauge, filler auge, torque wrench etc. are available for use		5	0	5
	PC11. Report damaged / defective components of equipment as per the escalation matrix		15	5	10
	NOS Total Marks	Total	150	35	115
ISC/N0934: Carry out the operation of mobile equipment (light, medium, heavy and mobile crane) maintenance	PC1. Dismantle the equipment, as needed	300	10	0	10
	PC2. Repair or replace the defective parts		20	5	15
	PC3. Assemble the parts according to the equipment maintenance manual		15	5	10
	PC4. Fasten mechanical components/ subassemblies together using screws, bolts, and collars using hand/ power tools		15	0	15
	PC5. Set and adjust linkages, tensions and clearances of assembled components to specifications using fixed gauges and hand tools		15	5	10
	PC6. Re assemble the parts post correcting the defect		15	0	15
	PC7. Understand the standard requirements of oil, lubricant, coolant level etc. in the		15	5	10



Assessment outcome (nos)	Assessment criteria	Total marks	Out of	Marks allocation	
				Theory	Skills practical
	equipment				
	PC8. Check the oil, lubricant, coolant level, belts etc. as per norms		15	0	15
	PC9. Rectify any deviations from the norms		15	0	15
	PC10. Understand what parameters are to be checked immediately post start of the equipment		15	5	10
	PC11. Check oil pressure, temperature, break, light etc. start-up parameters post start		15	5	10
	PC12. Identify any deviations from prescribed levels		10	0	10
	PC13. Report any deviations to supervisor so as to take necessary actions to rectify them		10	0	10
	PC14. Understand the normal running condition of the equipment on full load as per manufacturers guideline		15	5	10
	PC15. Understand the consumption of fuel for specified load condition		15	5	10
	PC16. Understand the fault observed during operation, necessary corrective measures to be taken depending on the observation		10	0	10
	PC17. Ensure testing and adjustment of mobile equipment components as per maintenance manual		15	5	10
	PC18. Check vibrations to ensure they are within desired limits		15	0	15



Assessment outcome (nos)	Assessment criteria	Total marks	Out of	Marks allocation	
				Theory	Skills practical
	PC19. Test the mobile equipment to ensure it is fit to use before handover		10	0	10
	PC20. Record the test results in the prescribed format of mobile equipment maintenance manual		10	0	10
	PC21. Ensure all activities are complete according to checklist		15	5	10
	PC22. Communicate to supervisor on completion of given job in case of any deviations from checklist		10	0	10
	NOS Total Marks	Total	300	50	250
ISC/N0008: Use basic health and safety practices at the workplace	PC1. Use protective clothing/equipment for specific tasks and work conditions	150	9	4	5
	PC2. State the name and location of people responsible for health and safety in the workplace		6	1	5
	PC3. State the names and location of documents that refer to health and safety in the workplace		2	1	1
	PC4. Identify job-site hazardous work and state possible causes of risk or accident in the workplace		8	4	4
	PC5. Carry out safe working practices while dealing with hazards to ensure the safety of self and others state methods of accident prevention in the work environment of the job role		6	1	5
	PC6. State location of general health and safety equipment in the workplace		6	1	5



Assessment outcome (nos)	Assessment criteria	Total marks	Marks allocation		
			Out of	Theory	Skills practical
	PC7. Inspect for faults, set up and safely use steps and ladders in general use		6	1	5
	PC8. Work safely in and around trenches, elevated places and confined areas		6	1	5
	PC9. Lift heavy objects safely using correct procedures		6	1	5
	PC10. Apply good housekeeping practices at all times		2	1	1
	PC11. Identify common hazard signs displayed in various areas		6	5	1
	PC12. Retrieve and/or point out documents that refer to health and safety in the workplace		5	1	4
	PC13. Use the various appropriate fire extinguishers on different types of fires correctly		9	4	5
	PC14. Demonstrate rescue techniques applied during fire hazard		8	4	4
	PC15. Demonstrate good housekeeping in order to prevent fire hazards		2	1	1
	PC16. Demonstrate the correct use of a fire extinguisher		6	1	5
	PC17. Demonstrate how to free a person from electrocution		6	1	5
	PC18. Administer appropriate first aid to victims as required e.g. in case of bleeding, burns, choking, electric shock, poisoning etc.		8	3	5



Assessment outcome (nos)	Assessment criteria	Total marks	Marks allocation		
			Out of	Theory	Skills practical
	PC19. Demonstrate basic techniques of bandaging		6	1	5
	PC20. Respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments		7	2	5
	PC21. Perform and organize loss minimization or rescue activity during an accident in real or simulated environments		6	1	5
	PC22. Administer first aid to victims in case of a heart attack or cardiac arrest due to electric shock, before the arrival of emergency services in real or simulated cases		6	1	5
	PC23. Demonstrate the artificial respiration and the CPR Process		6	1	5
	PC24. Participate in emergency procedures		6	1	5
	PC25. Complete a written accident/incident report or dictate a report to another person, and send report to person responsible		4	1	3
	PC26. Demonstrate correct method to move injured people and others during an emergency		2	1	1
	NOS Total Marks	Total	150	45	105
ISC/N0009: Work effectively with others	PC1. Accurately receive information and instructions from the supervisor and fellow workers, getting clarification where required	100	10	5	5
	PC2. Accurately pass on information to authorized persons who require it and within agreed timescale and confirm its receipt		10	5	5



Assessment outcome (nos)	Assessment criteria	Total marks	Out of	Marks allocation	
				Theory	Skills practical
	PC3. Provide information to others clearly, at a pace and in a manner that helps them to understand		10	0	10
	PC4. Display helpful behavior by assisting others in performing tasks in a positive manner, where required and possible		10	5	5
	PC5. Consult with and assist others to maximize effectiveness and efficiency in carrying out tasks		10	5	5
	PC6. Display appropriate communication etiquette while working		10	0	10
	PC7. Display active listening skills while interacting with others at work		10	0	10
	PC8. Use appropriate tone, pitch and language to convey politeness, assertiveness, care and professionalism		10	5	5
	PC9. Demonstrate responsible and disciplined behaviors at the workplace		15	5	10
	PC10. Escalate grievances and problems to		5	0	5
	NOS Total Marks	Total	100	30	70
	Grand Total	1000	1000	235	765
	Percentage Weightage:			50%	50%
	Minimum Pass% to qualify (aggregate):			60%	