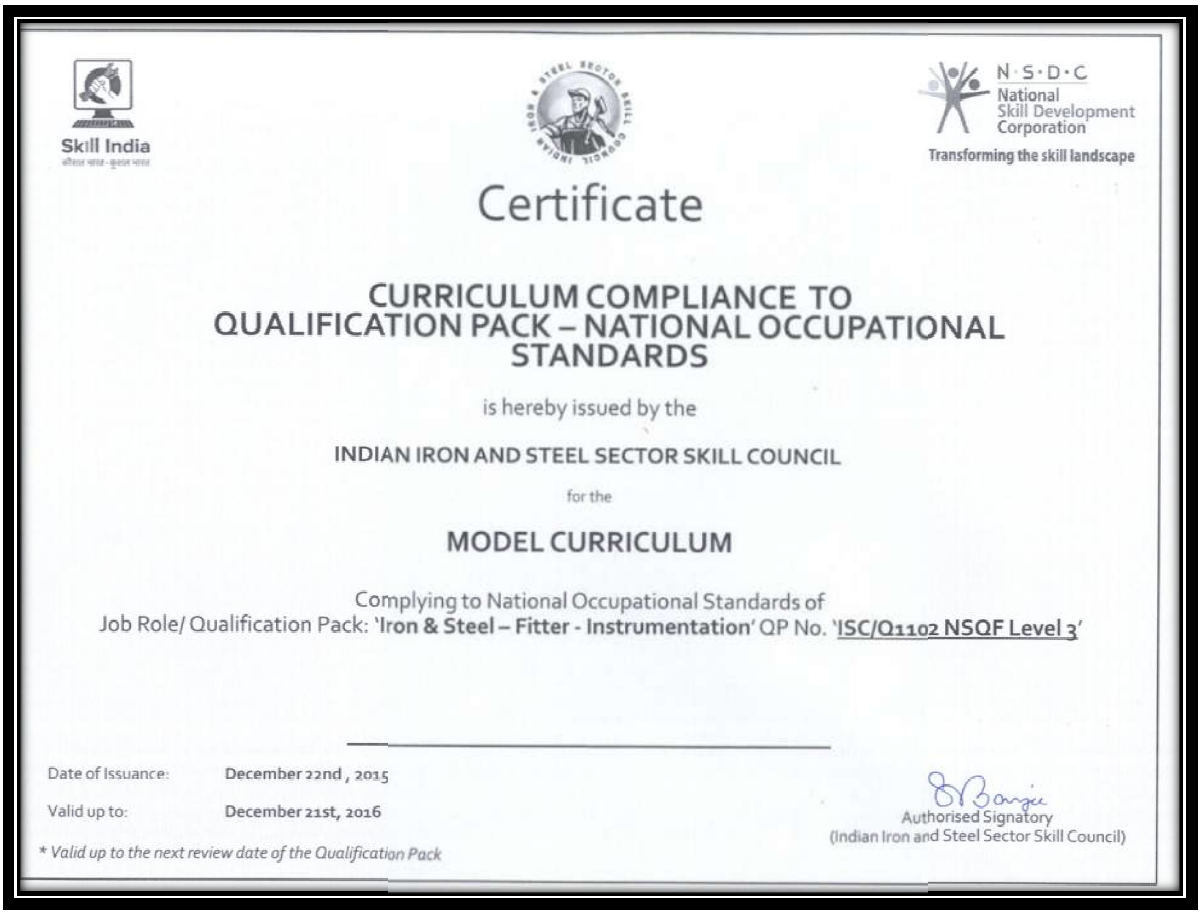
Model Curriculum

Iron & Steel-Fitter Instrumentation

SECTOR:	**IRON & STEEL**
SUB-SECTOR:	**STEEL, SPONGE – IRON, FERRO ALLOYS, RE ROLLERS, REFRACTORY**
OCCUPATION:	**ELECTRONICS & INSTRUMENTATION MAINTENANCE**
REF ID:	**ISC/Q1102**
NSQF LEVEL:	**3**



Skill India

N·S·D·C National Skill Development Corporation
Transforming the skill landscape

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: '**Iron & Steel – Fitter - Instrumentation**' QP No. '**ISC/Q1102 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)

TABLE OF CONTENTS

Iron & Steel-Fitter-Instrumentation

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a "Fitter Instrumentation", in the "Iron & Steel" Sector/Industry and aims at building the following key competencies amongst the learner.

Program Name	**Iron & Steel-Fitter Instrumentation**		
Qualification Pack Name & Reference ID.	**Iron & Steel- Fitter Instrumentation ISC/Q1102**		
Version No.	1.0	**Version Update Date**	31-12-2015
Pre-requisites to Training	Minimum qualification – 10th standard		
Training Outcomes	**After completing this programme, participants will be able to:** • Carry out maintenance activities under the guidance and supervision of Technician Instrumentation • Periodically check measuring equipment for operation and ensure proper calibration • Use basic health and safety practices at the workplace • Work effectively with others		

This course encompasses 4 out of 4 National Occupational Standards (NOS) of "Fitter Instrumentation" 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) 08:00 **Practical Duration** (hh:mm) 00:00 **Corresponding NOS Code**	• 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** (hh:mm) 08:00	• Understanding the Occupational health & Safety • Understanding of work related hazards. • Documentation for Health and safety • Working at Heights, confined spaces • Solutions for fire at work place	PPTs for OHAS related to Job Role, Display Material for PPEs related to Job Role, Safety Material

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	Practical Duration (hh:mm) 16:00 **Corresponding NOS Code** ISC/N0008		
3	**Carry out maintenance activities under the guidance and supervision of Technician Instrumentation** **Theory Duration** (hh:mm) 23:00 **Practical Duration** (hh:mm) 99:00 **Corresponding NOS Code** ISC/N1102	• Performing repeated activities under guidance • Fixing transducers & pickup devices properly • Interim reporting to Supervisor wherever/ whenever needed • Work wise recognition of tools • Diagnosing the common defects of tools • Using of hand tools • Using of measuring instruments	PPTs of various hand tools and display of gauges, thermocouples, load cells, calibration tools & precession measuring instruments, mechanical governors
4	**Periodically check measuring equipment for operation and ensure proper calibration** **Theory Duration** (hh:mm) 24:00 **Practical Duration** (hh:mm) 100:00 **Corresponding NOS Code** CSC/N1103	• Checking equipment for correct operation • Testing measure and control equipment • Analysing and reporting test results • Calibrating measure and control equipment • Escalating unsolved problem as per protocol • Giving interim feedback to Technician Instrumentation, in case of delays • Process compliances	PPTs of various hand tools and display of gauges, thermocouples, load cells, calibration tools & precession measuring instruments, mechanical governors
5	**Use basic health and safety practices at the workplace** **Duration** (hh:mm) 04:00 **Practical Duration** (hh:mm) 08:00 **Corresponding NOS**	• Understanding Health and safety procedures • Understanding Fire safety procedures • Understanding 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

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	Code ISC/N0008		
6	**Work effectively with others** **Theory Duration** (hh:mm) 03:00 **Practical Duration** (hh:mm) 05:00 **Corresponding NOS Code** ISC/N0009	• 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 **Theory Duration 70:00** **Practical Duration 230:00**	**Unique Equipment Required:** • Sample Electrical Drawing, Blueprints, • Basic Electrician Tools and Equipment's, • Hand tools such as files, pliers etc. • Precessions measuring instruments such as Micro meter, Venire calliper & various gauges • Different types of cables, switch, socket, relay, MCB, Contactors etc. • Pressure (e.g. absolute, gauge, vacuum) • Flow (e.g. orifice plate, venture tube, electromagnetic, ultrasonic, differential pressure cell, positive displacement) • Level (e.g. Gauges, floats, displacer, differential pressure cells, load cells, ultrasonic, capacitive, conductivity) • Temperature (e.g. bi-metallic, thermocouples, resistance, infra-red, thermal imaging) • Weight (e.g. mechanical systems, load cells/strain gauges, transducers) • Fiscal metering (e.g. gas, electricity, water, fuel) • Detection and alarm (e.g. smoke, heat, gas, chemical, water, metal) • Speed measurement (e.g. mechanical, electrical, stroboscopic) • Speed control (e.g. mechanical governors, electrical governors, DC speed controller, AC motor control systems, stepper motors, invertors) • Vibration monitoring (e.g. vibration switches, proximity probes, seismic velocity transducer, linear variable differential transformers, portable data collectors) • Analysers (e.g. gas detection, spectroscopy, oxygen analyser, water Material and Equipment for cleaning • Sample Documents, • Sample quality Controlling formats • Personal protective Equipment's and clothes • 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 • Telemetry systems (e.g. master station, outstation, standalone	

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		systems) • Valves and valve mechanisms (e.g. control valves, valve actuators and positioners)	

Grand Total Course Duration: **300Hours, 0 Minutes**

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

Trainer Prerequisites for Job role: "Fitter Electrical assembly" mapped to Qualification Pack: "ISC/Q1102"

Sr. No.	Area	Details
1	**Description**	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack "ISC/Q1102".
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 Electrical pass and preferably passed from Craftsman Training Institute/Advanced Training Institute or Diploma Electrical
4a	**Domain Certification**	Certified for Job Role: "Fitter – Instrumentation" mapped to QP: "ISC/Q1102". 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 untrained for same Job Role/ Trade

Annexure: Assessment Criteria

Assessment Criteria	
Job Role	**Iron & Steel - Fitter Instrumentation**
Qualification Pack	**ISC/Q1102**
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.

				Marks allocation	
Assessment outcome	**Assessment criteria**	**Total marks**	**Out of**	**Theory**	**Skills practical**
ISC/N1102: Carry out Maintenance Activities under the guidance and supervision of technician instrumentation	PC1. Confirm from "Technician Instrumentation" that the measuring device is functioning within tolerance limits	**450**	8	2	6
	PC2. In case of errors in reading, re-fix / re-position the pick-up till reading comes to the satisfying range		25	10	15
	PC3. Understand the characteristics of linking device so that no transmission errors take place due to intermediate losses / interference		22	12	10
	PC4. Identify and execute suitable rerouting of transmission system in case of need to achieve satisfactory results		20	10	10

				Marks allocation	
Assessment outcome	**Assessment criteria**	**Total marks**	**Out of**	**Theory**	**Skills practical**
	PC5. Activities for satisfactory performance: • Maintenance procedures/instructions/operator manuals/working instructions • Preventive maintenance (routine inspections, and adjustments) • Corrective maintenance (activities identified from preventative maintenance activities) • Predictive maintenance (analysis of the equipment's condition) • Reactive maintenance (unexpected equipment/component failure) • Maintenance prevention (equipment / component design and development) • Health and safety • Regulatory compliance		70	20	50
	PC6. Re-connect and return the system to service on completion of activities		40	15	25
	PC7. Conduct maintenance activities within the limits of their personal & authority		15	5	10
	PC8. Carry out the maintenance activities in the specified sequence and in an agreed timescale		25	5	20
	PC9. Report any instances where the maintenance activities cannot be fully met or where there are identified defects outside the planned schedule		30	10	20
	PC10. Complete relevant maintenance documentation accurately		28	8	20
	PC11. Dispose of waste materials in accordance with safe working practices and approved procedures		20	5	15

				Marks allocation	
Assessment outcome	**Assessment criteria**	**Total marks**	**Out of**	**Theory**	**Skills practical**
	PC12. Re-position the pick-up / sensor to better location as advised by “Technician Instrumentation”		25	10	15
	PC13. Re-fix the pick-up / sensor with better fixing device / fastener as advised by “Technician Instrumentation”		28	8	20
	PC14. Monitor the problem and keep the superior informed about progress or any delays in resolving the problem		15	5	10
	PC15. Refer the problem to “Technician Instrumentation” or competent internal / external specialist if it cannot be resolved		15	5	10
	PC16. Obtain help or advice from specialist if the problem is outside candidate’s area of competence or experience		15	5	10
	PC17. All the above activities are to achieve proper output on display from measuring monitoring instrument		15	5	10
	PC18. Since “Technician Instrumentation” is responsible for ultimate performance of measuring monitoring instrument, the ultimate objective of instrumentation fitter is to obtain satisfaction of “Technician Instrumentation”		20	5	15
	PC19. Comply with relevant SOPs		14	4	10
	NOS Total Marks	**Total**	**450**	**149**	**301**
ISC/N1103: Periodically check measuring equipment for operation and ensure proper calibration	PC1. Appropriate checks are made of components, leads, fasteners, etc. for wear, loose connections or other faults	**300**	13	5	8
	PC2. Produce and update relevant testing/calibration schedules and plans.		13	5	8
	PC3. Carry out the testing/calibration activities in the specified sequence and in an agreed timescale		20	5	15

				Marks allocation	
Assessment outcome	**Assessment criteria**	**Total marks**	**Out of**	**Theory**	**Skills practical**
	PC4. Work/test requirements are identified and defined to standard operating procedures		12	2	10
	PC5. Inspect and test the operation of instruments and systems to diagnose faults using testing devices		30	10	20
	PC6. Correct test application principles are selected after inspection of instrumentation systems, equipment/components		15	5	10
	PC7. Appropriate test equipment is selected in accordance with defined requirements		25	5	20
	PC8. Device isolation methods/requirements are observed and localised		15	5	10
	PC9. Appropriate test procedures and application principles are applied in assessing operation of instrumentation systems, equipment/components		15	5	10
	PC10. Report any instances where the testing/calibration activities cannot be fully met or where there are identified defects outside the planned schedule		25	10	15
	PC11. Complete relevant testing/calibration documentation accurately		7	2	5
	PC12. Test results are analyzed/verified against operational specifications and localized faults are confirmed		15	5	10
	PC13. Potential and real faults are reported based on standard operating procedures		7	2	5
	PC14. Faulty conditions are evaluated and corrective action is planned		15	5	10

				Marks allocation	
Assessment outcome	**Assessment criteria**	**Total marks**	**Out of**	**Theory**	**Skills practical**
	PC15. Action plan is recorded and documented according to standard operating procedures		7	2	5
	PC16. Calibration of measuring and control equipment is assessed to manufacturers' specifications and/or standard operating procedures		7	2	5
	PC17. Equipment is calibrated against appropriate physical standards using correct calibration devices, equipment, techniques using predetermined procedures		7	2	5
	PC18. Zero, span and range checks are undertaken on indicators/controllers using correct and appropriate configuration		7	2	5
	PC19. Wherever applicable, methods of adjustment using calibration devices are performed and documented to prescribed procedures and operational specifications		15	5	10
	PC20. Equipment is re commissioned in accordance with standard operating procedures		7	2	5
	PC21. Refer the problem to a “Technician Instrumentation” if it cannot be resolved		4	2	2
	PC22. Monitor the problem and keep the supervisor informed about progress or any delays in resolving the problem		4	2	2
	PC23. Comply with relevant SOPs		15	5	10
	NOS Total Marks	**Total**	**300**	**95**	**205**
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		2	1	1

			Marks allocation		
Assessment outcome	**Assessment criteria**	**Total marks**	**Out of**	**Theory**	**Skills practical**
	to health and safety in the workplace				
	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
	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,		8	3	5

				Marks allocation	
Assessment outcome	**Assessment criteria**	**Total marks**	**Out of**	**Theory**	**Skills practical**
	choking, electric shock, poisoning etc.				
	PC19. Demonstrate basic techniques of		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
	PC3. Provide information to others clearly, at a pace and in a manner that helps them to understand		10	0	10

			Marks allocation		
Assessment outcome	**Assessment criteria**	**Total marks**	**Out of**	**Theory**	**Skills practical**
	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		**100**	**30**	**70**
	Grand Total		**1000**	**344**	**656**
	Percentage Weightage:			**50%**	**50%**
	Minimum Pass% to qualify (aggregate):			**60%**	