



# Model Curriculum

**QP Name: Technician Instrumentation**

**QP Code: CSC/Q0802**

**Version: 2.0**

**NSQF Level: 4**

**Model Curriculum Version: 1.0**

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## Training Parameters

<b>Sector</b>	Capital Goods
<b>Sub-Sector</b>	Machine Tools, Dies, Moulds and Press Tools, Plastics Manufacturing Machinery, Textile Manufacturing Machinery, Process Plant Machinery, Electrical and Power Machinery, Light Engineering Goods
<b>Occupation</b>	Calibration and Instrumentation
<b>Country</b>	India
<b>NSQF Level</b>	4
<b>Aligned to NCO/ISCO/ISIC Code</b>	NCO-2015/ 7311.67
<b>Minimum Educational Qualification and Experience</b>	<p>8th Class Pass + ITI (2years) with 2 years of experience in the relevant field</p> <p>OR</p> <p>10th Class Pass with 2 years of experience in the relevant field</p> <p>OR</p> <p>10th Class Pass + ITI (1 year after Class 10th) with 1 year of experience in the relevant field</p> <p>OR</p> <p>10th Class Pass + ITI (2 years after Class 10th)</p> <p>OR</p> <p>12th Class Pass with 6 months of experience in the relevant field</p> <p>OR</p> <p>Certified in NSQF-L3 Operator - Calibration and Instrumentation with 2 years of experience in the relevant field</p>
<b>Pre-Requisite License or Training</b>	NA
<b>Minimum Job Entry Age</b>	18 Years
<b>Last Reviewed On</b>	NA
<b>Next Review Date</b>	NA
<b>NSQC Approval Date</b>	NA
<b>QP Version</b>	2.0
<b>Model Curriculum Creation Date</b>	NA

<b>Model Curriculum Valid Up to Date</b>	NA
<b>Model Curriculum Version</b>	1.0
<b>Minimum Duration of the Course</b>	420 Hours
<b>Maximum Duration of the Course</b>	420 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 should have acquired the listed knowledge and skills to:

- Explain the importance of following the health and safety practices at work.
- Demonstrate ways to coordinate with co-workers to achieve work efficiency.
- Demonstrate the process of calibrating the hydraulic, pneumatic, mechanical, electrical and electronic measuring and control equipment.
- Demonstrate the process of carrying out maintenance activities on instrumentation and control equipment.

### Compulsory Modules

The table lists the modules and their duration corresponding to the Compulsory NOS of the QP.

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
<b>Bridge Module</b>	<b>04:00</b>	<b>00:00</b>	<b>0:00</b>	<b>00:00</b>	<b>04:00</b>
Module 1: Introduction to the role of a Technician Instrumentation	04:00	0:00	0:00	00:00	04:00
<b>CSC/N1335 Follow the health and safety practices at work</b> <b>NOS Version- 2.0</b> <b>NSQF Level- 3</b>	<b>20:00</b>	<b>60:00</b>	<b>0:00</b>	<b>00:00</b>	<b>80:00</b>
Module 2: Health and safety practices	20:00	60:00	0:00	00:00	80:00
<b>CSC/N1336 Coordinate with co-workers to achieve work efficiency</b> <b>NOS Version-2.0</b> <b>NSQF Level- 3</b>	<b>20:00</b>	<b>60:00</b>	<b>0:00</b>	<b>00:00</b>	<b>80:00</b>
Module 3: Process of coordinating with co-workers to achieve work efficiency	20:00	60:00	0:00	00:00	80:00
<b>CSC/N0801 Calibrate the hydraulic, pneumatic, mechanical, electrical and electronic measuring and control equipment</b>	<b>54:00</b>	<b>74:00</b>	<b>0:00</b>	<b>00:00</b>	<b>128:00</b>

<b>NOS Version- 2.0</b> <b>NSQF Level- 4</b>					
Module 4: Process of calibrating the hydraulic, pneumatic, mechanical, electrical and electronic measuring and control equipment	54:00	74:00	0:00	00:00	128:00
<b>CSC/N0803 Carry out maintenance activities on instrumentation and control equipment</b> <b>NOS Version- 2.0</b> <b>NSQF Level- 4</b>	<b>52:00</b>	<b>76:00</b>	<b>0:00</b>	<b>00:00</b>	<b>128:00</b>
Module 5: Process of carrying out maintenance activities on instrumentation and control equipment	52:00	76:00	0:00	00:00	128:00
<b>Total Duration</b>	<b>150:00</b>	<b>270:00</b>	<b>0:00</b>	<b>00:00</b>	<b>420:00</b>

# Module Details

## Module 1: Introduction to the role of a Technician Instrumentation

### Bridge Module

#### Terminal Outcomes:

- Discuss the job role of a Technician Instrumentation.

<b>Duration: 04:00</b>	<b>Duration: 0:00</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Describe the size and scope of the capital good industry and its sub-sectors.</li> <li>• Discuss the role and responsibilities of a Technician Instrumentation.</li> <li>• Identify various employment opportunities for a Technician Instrumentation.</li> </ul>	
<b>Classroom Aids</b>	
Training Kit - Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films	
<b>Tools, Equipment and Other Requirements</b>	
NA	

## Module 2: Health and safety Practices

### Mapped to CSC/N1335 v2.0

#### Terminal Outcomes:

- Demonstrate ways to maintain personal health and safety.
- Describe the process of assisting in hazard management.
- Explain how to check the first aid box, firefighting and safety equipment.
- Describe the process of assisting in waste management.
- Explain the importance of following the fire safety guidelines.
- Explain the importance of following the emergency and first-aid procedures.
- Demonstrate the process of carrying out relevant documentation and review.

<b>Duration: 20:00</b>	<b>Duration: 60:00</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Explain the recommended practices to be followed to ensure protection from infections and transmission to others, such as the use of hand sanitizer and face mask.</li> <li>• Explain the importance and process of checking the work conditions, assessing the potential health and safety risks, and take appropriate measures to mitigate them.</li> <li>• Explain the importance and process of selecting and using the appropriate PPE relevant to the task and work conditions.</li> <li>• Explain the recommended techniques to be followed while lifting and moving heavy objects to avoid injury.</li> <li>• Explain the importance of following the manufacturer’s instructions and workplace safety guidelines while working on heavy machinery, tools and equipment.</li> <li>• Explain the importance and process of identifying existing and potential hazards at work.</li> <li>• Describe the process of assessing the potential risks and injuries associated with the various hazards.</li> <li>• Explain how to prevent or minimise different types of hazards.</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate the use of appropriate Personal Protective Equipment (PPE) relevant to the task and work conditions.</li> <li>• Demonstrate how to handle hazardous materials safely.</li> <li>• Demonstrate the process of testing the firefighting and various safety equipment to ensure they are in usable condition.</li> <li>• Demonstrate the process of recycling and disposing different types of waste appropriately.</li> <li>• Demonstrate how to use the appropriate type of fire extinguisher to extinguish different types of fires safely.</li> <li>• Demonstrate how to administer appropriate first aid to the injured personnel.</li> <li>• Demonstrate the process of performing Cardiopulmonary Resuscitation (CPR) on a potential victim of cardiac arrest.</li> <li>• Demonstrate the process of carrying out appropriate documentation following a health and safety incident at work, including all the required information.</li> </ul>



- Explain how to handle and store hazardous materials safely.
- Explain the importance of ensuring the first aid box is updated with the relevant first aid supplies.
- Describe the process of checking and testing the firefighting and various safety equipment to ensure they are in a usable condition.
- Explain the criteria for segregating waste into appropriate categories.
- Describe the appropriate methods for recycling the recyclable waste.
- Describe the process of disposing of the non-recyclable waste safely and the applicable regulations.
- Explain the use of different types of fire extinguishers to extinguish different types of fires.
- State the recommended practices to be followed for a safe rescue during a fire emergency.
- Explain how to request assistance from the fire department to extinguish a serious fire.
- Explain the appropriate practices to be followed during workplace emergencies to ensure safety and minimise loss to organisational property.
- State the common health and safety hazards present in a work environment, associated risks, and how to mitigate them.
- State the safe working practices to be followed while working at various hazardous sites and using electrical equipment.
- Explain the importance of ensuring easy access to firefighting and safety equipment.
- Explain the appropriate preventative and remedial actions to be taken in the case of exposure to toxic materials, such as poisonous

chemicals and gases.

- Explain various causes of fire in different work environments and the recommended precautions to be taken to prevent fire accidents.
- Describe different methods of extinguishing fire.
- List different materials used for extinguishing fire.
- Explain the applicable rescue techniques to be followed during a fire emergency.
- Explain the importance of placing safety signs and instructions at strategic locations in a workplace and following them.
- Explain different types of first aid treatment to be provided for different types of injuries.
- State the potential injuries associated with incorrect manual handling.
- Explain how to move an injured person safely.
- State various hazards associated with the use of various machinery, tools, implements, equipment and materials.
- Explain the importance of ensuring no obstruction and free access to fire exits.
- Explain how to free a person from electrocution safely.
- Explain how to administer appropriate first aid to an injured person.
- Explain how to perform Cardiopulmonary Resuscitation (CPR).
- Explain the importance of coordinating with the emergency services to request urgent medical assistance for persons requiring professional medical attention or hospitalisation.
- State the appropriate documentation

<p>to be carried out following a health and safety incident at work, and the relevant information to be included.</p> <ul style="list-style-type: none"> <li>• Explain the importance and process of reviewing the health and safety conditions at work regularly or following an incident.</li> <li>• Explain the importance and process of implementing appropriate changes to improve the health and safety conditions at work.</li> </ul>	
<p><b>Classroom Aids</b></p>	
<p>Computer, Projection Equipment, PowerPoint Presentation and Software, Facilitator’s Guide, Participant’s Handbook.</p>	
<p><b>Tools, Equipment and Other Requirements</b></p>	
<p>Personal Protective Equipment, Cleaning Equipment and Materials, Sanitizer, Soap, Mask</p>	

## Module 3: Process of coordinating with co-workers to achieve work efficiency

*Mapped to NOS CSC/N1336 v2.0*

### Terminal Outcomes:

- Demonstrate ways to Work and communicate effectively with co-workers.
- Discuss ways to promote diversity and inclusion at the workplace.

Duration: 20:00	Duration: 60:00
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> <li>• Explain the importance and process of effective communication in the workplace.</li> <li>• Explain the barriers to effective communication and how to overcome them.</li> <li>• Explain the importance of teamwork in an organisation’s and individual’s success.</li> <li>• Explain the importance of active listening in the work environment.</li> <li>• State the appropriate techniques to be followed for active listening.</li> <li>• Explain the importance of tone and pitch ineffective communication.</li> <li>• Explain the importance of avoiding casual expletives and unpleasant terms while communicating professional circles.</li> <li>• Explain the importance of maintaining discipline and ethical behaviour at work.</li> <li>• <b>State</b> the common reasons for interpersonal conflict and how to resolve them.</li> <li>• Explain the importance of developing effective working relationships for professional success.</li> <li>• Describe the process of expressing and addressing grievances appropriately and effectively.</li> <li>• Explain the importance and process of planning daily tasks to ensure their timely completion and efficient use of</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate the process of preparing the relevant documents and reports as per the supervisor’s instructions, providing appropriate information clearly and systematically.</li> <li>• Demonstrate how to mentor and assist subordinates in the execution of their work responsibilities.</li> <li>• Demonstrate the process of using various resources efficiently to ensure maximum utilisation and minimum wastage.</li> <li>• Demonstrate how to communicate clearly and politely to ensure effective communication with co-workers.</li> <li>• Demonstrate appropriate verbal and non-verbal communication that is respectful of genders and disability.</li> </ul>

<p>time.</p> <ul style="list-style-type: none"> <li>• Explain the importance of adhering to the limits of authority at work.</li> <li>• Explain the importance of following the applicable quality standards and timescales at work.</li> <li>• Explain the importance of coordinating with co-workers to achieve the work objectives efficiently.</li> <li>• Explain the relevant documentation requirements.</li> <li>• Explain the importance of providing appropriate information clearly and systematically in work documents.</li> <li>• State the escalation matrix to be followed to deal with out of authority tasks and concerns.</li> <li>• Explain the importance and process of mentoring and assisting subordinates in the execution of their work responsibilities.</li> <li>• Explain how to identify possible disruptions to work prevent them.</li> <li>• Explain how to use various resources efficiently to ensure maximum utilisation and minimum wastage.</li> <li>• Explain the recommended practices to be followed at work to avoid and resolve conflicts at work.</li> <li>• Explain the importance and process of efficient and timely dissemination of information to the authorised personnel.</li> <li>• Explain the procedure to report inappropriate behaviour e.g., harassment.</li> </ul>	
<p><b>Classroom Aids:</b></p>	
<p>Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop</p>	
<p><b>Tools, Equipment and Other Requirements</b></p>	
<p>NA</p>	

## Module 4: Process of calibrating the hydraulic, pneumatic, mechanical, electrical and electronic measuring and control equipment

*Mapped to CSC/N0801 v2.0*

### Terminal Outcomes:

- Describe the process of preparing the testing equipment.
- Demonstrate the process of testing the measuring and control equipment.
- Demonstrate the process of carrying out fault management.
- Demonstrate the process of calibrating the measuring and control equipment.

<b>Duration: 54:00</b>	<b>Duration: 74:00</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• Explain the SOP for calibrating the measuring equipment and the relevant tools and equipment required for that.</li> <li>• Explain the SOP for commissioning the measuring equipment.</li> <li>• List the relevant calibration records to be maintained.</li> <li>• State the recommended specifications for measuring equipment and components for their optimum functioning.</li> <li>• Explain the use of relevant tools and equipment for checking measuring equipment for faults.</li> <li>• Explain the use of appropriate techniques to check the calibration of the measuring equipment for conformance to specifications.</li> <li>• Describe the process of calibrating the measuring equipment according to the appropriate physical standard.</li> <li>• Describe the process of recommissioning the measuring equipment.</li> <li>• List the appropriate checks to be made on the measuring equipment and the use of relevant tools and equipment for the purpose.</li> <li>• Explain how to resolve the common faults found in the measuring equipment.</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate the process of repairing or replacing the faulty/ worn-out/ damaged components, as appropriate.</li> <li>• Demonstrate the process of carrying out standard serviceability tests and calibration; special-to-type tests; operational/function checks, and gauge repeatability and reliability tests.</li> <li>• Demonstrate how to conduct the gauge repeatability and reliability tests.</li> <li>• Demonstrate the process of carrying out relevant documentation manually and/ or electronically with respect to the testing/calibration activities.</li> <li>• Demonstrate how to analyse and verify the test results against the operational specifications to identify and localise faults.</li> <li>• Show how to prepare and document an action plan as per the applicable procedures, including all the relevant information.</li> <li>• Demonstrate the process of calibrating the measuring and control equipment as per the applicable physical standards using the appropriate calibration tools, equipment and techniques.</li> <li>• Demonstrate how to perform the zero span and range checks on indicators/controllers using the</li> </ul>

<ul style="list-style-type: none"> <li>• State the impact of faults on the performance/accuracy of the measuring equipment.</li> <li>• Explain the hazards and controls relevant to calibrating the measuring equipment.</li> <li>• Explain the functionality of the measuring equipment and the recommended tolerance levels for calibration.</li> <li>• Explain the applicable instrumentation principles such as controlling density, level, flow, temperature, composition and arrangement of materials.</li> <li>• State the principles of hydraulic and pneumatic flow.</li> <li>• State the application principles for assessing the operation of instrumentation systems and equipment/components.</li> <li>• Describe the procedure and use of relevant equipment for inspecting and testing the instrumentation system.</li> <li>• Describe the calibration procedures for instrumentation systems and equipment/ components.</li> <li>• Explain the purpose and functions of the instrumentation system.</li> <li>• List the specifications of different types of instrumentation systems and the acceptable deviations from specifications.</li> <li>• Describe the procedure for repairing a faulty instrumentation system.</li> <li>• Explain the relevant techniques for dismantling, testing and reassembling an instrumentation system.</li> <li>• Explain the correct operation of the instrumentation system and the procedure for isolating instrumentation systems.</li> <li>• Explain different types of faults found in an instrumentation system and</li> </ul>	<p>recommended configuration.</p> <ul style="list-style-type: none"> <li>• Demonstrate the process of carrying out appropriate adjustments to the operational specifications using the relevant calibration devices and procedures.</li> <li>• Demonstrate the process of carrying out relevant documentation as per the organisational procedure.</li> </ul>
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equipment components.

- Describe the process for checking and verifying the operational function of the instrumentation system and equipment.
- Describe the process of recording and completing service reports.
- State the operational specifications of the instrumentation system and equipment.
- Explain how to resolve variations between test results and operational specifications.
- Explain the causes of common faults found in the instrumentation system and equipment components.
- List the appropriate corrective action to be taken to rectify the causes of faults in the instrumentation systems and equipment.
- Describe the process of correcting faults in the instrumentation system and equipment components.
- Explain the importance and process of reporting the unresolved faults.
- Explain the difference between real and potential faults
- Describe the process for documenting test and calibration results.
- Explain the function and process of carrying out zero-and-span checks on instrumentation systems and equipment.
- List the relevant equipment required to carry out the calibration of instrumentation systems and equipment.
- Explain the use of various and testing and calibration tools such as pressure gauge, standard test gauge, micrometre, etc.
- Explain the relevant documentation to be completed such as job card, progress report, incident report,



<p>calibration labels, etc.</p> <ul style="list-style-type: none"> <li>• List the relevant calibration records to be maintained.</li> <li>• List the measuring equipment specifications, their use, connections and components.</li> </ul>	
<p><b>Classroom Aids</b></p>	
<p>Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop</p>	
<p><b>Tools, Equipment and Other Requirements</b></p>	
<p>Load Cells, Strain Gauges, Transducers, Mechanical Governors, Pressure Gauges, Micrometers, Jigs and Fixtures, Templates and Patterns, Insulation Testers, Vernier Calliper, Dead Weight Tester, Manometers, Gyroscope, Screw Driver, Testers Etc</p>	

## Module 5: Process of carrying out maintenance activities on instrumentation and control equipment

*Mapped to CSC/N0803 v2.0*

### Terminal Outcomes:

- Describe the process of preparing for the maintenance activities.
- Demonstrate the process of carrying out the maintenance activities.
- Explain the importance of Coordinating with the supervisor.
- Explain the importance of using resource optimally.

<b>Duration: 52:00</b>	<b>Duration: 76:00</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• State the appropriate documentation to be carried out, such as job card, work permit, risk assessment, sign-on/off, maintenance logs, etc.</li> <li>• Describe the applicable isolation and lock-off procedures or permit-to-work procedure that applies.</li> <li>• State the relevant health and safety precautions to be taken during the maintenance process.</li> <li>• Explain how to minimise risks from the hazards associated with carrying out mechanical maintenance activities, such as handling oils, greases, stored pressure/force, use of complex tools and equipment.</li> <li>• Explain the importance of using the relevant Personal Protective Equipment (PPE) clothing during the maintenance activities.</li> <li>• Explain how to interpret drawings, specifications, manufacturers manuals and other documents needed during the maintenance process.</li> <li>• Explain the functioning of different process plants and the appropriate measuring and control equipment.</li> <li>• Describe the process to be adopted to establish the background of the fault.</li> <li>• Explain how to evaluate various types of information available for fault</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate how to prepare and update the relevant maintenance schedules and plans.</li> <li>• Demonstrate the process of performing appropriate risk assessments before testing and maintenance activities.</li> <li>• Demonstrate the process of carrying out the maintenance activities on a range of instrumentation and control equipment, following the appropriate techniques and procedures.</li> <li>• Show how to conduct instrumentation evaluation for hydraulic, pneumatic, mechanical, electrical and electronic measuring and control equipment.</li> <li>• Show how to conduct the appropriate tests related to the functional performance of instruments, as required.</li> <li>• Demonstrate the use of the appropriate scientific and analytic computer software, calculators, electronic probes, voltage and current meters to diagnose faults in circuitry.</li> <li>• Demonstrate the use of the relevant testing devices to measure and control pressure, flow, temperature, level, motion, force, and chemical makeup.</li> <li>• Show how to adjust the system components and replace the</li> </ul>

diagnoses such as operator-provided information, equipment self-diagnosis, and testing instrument measurements.

- Explain the use of various testing instruments such as multimeter, oscilloscope, logic probe, signal tracer, signal generator, etc.
- Explain the use of various aids for fault diagnosis such as logic diagrams; fault analysis charts, etc.
- State the application of various fault finding techniques such as half-split technique, input/output technique, etc.
- Explain how to evaluate sensory conditions i.e. sight, sound, smell, touch.
- Explain how to analyse evidence and evaluate possible characteristics and causes of specific faults/problems.
- Explain how to relate to the previous reports/records of similar fault conditions.
- Explain how to evaluate the likely risk of running the equipment with the displayed fault, and the effects the fault could have on health and safety, and on the overall process or system.
- Describe the process of handling and maintaining instrumentation test instruments.
- Explain how to check that test instruments are within current calibration dates, and that they are free from damage and defects.
- State the relevant precautions to be taken to prevent Electrostatic Discharge (ESD) damage to electronic circuits and components.
- State the basic principles of operation of the instrumentation and control equipment.
- Explain how the instrumentation system functions and its operating sequence.

defective parts, as required.

- Demonstrate the process of carrying out troubleshooting for test failures to determine root causes and develop processes to avoid repeat failure.
- Demonstrate the process of carry out appropriate documentation to record the relevant information regarding the maintenance activities.
- Demonstrate how to optimise the usage of electricity and other resources in various tasks and processes.

<ul style="list-style-type: none"> <li>• Explain the working purpose of individual units/components such as gauges and meters and how they interact.</li> <li>• Explain the importance of ensuring the control systems are isolated or put into manual control, and appropriate trip locks, keys or program overrides are inserted before removing any sensors or instruments from the system.</li> <li>• Describe the process of identifying and selecting instrument sensors, including how to identify their markings; calibration information; component values; operating parameters and working range.</li> <li>• Explain the appropriate way of fitting instruments to avoid faulty readings caused by head correction, poor insulation or incorrect materials.</li> <li>• Describe the process of installing and connecting external wiring and components safely to avoid electronic interference or mechanical damage.</li> <li>• Explain how to carry out visual checks of the instruments including checking for leaks, security of joints and physical damage.</li> <li>• List the relevant replacement parts, materials and other items required for the maintenance process.</li> <li>• Explain the relevant techniques used to dismantle/assemble integrated equipment i.e. release of pressures/force, proof marking to aid reassembly.</li> <li>• Explain the importance and process of attaching identification marks/labels to removed components or cables, to assist with reassembly.</li> <li>• Describe the applicable methods for checking components are fit for purpose, and the need to replace electronic modules, sensors,</li> </ul>	
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<p>transmitters and other failed items.</p> <ul style="list-style-type: none"> <li>• Explain how to check that tools and equipment are free from damage or defects, are in a safe and usable condition, and are configured correctly for their intended purpose.</li> <li>• Describe the equipment operating and control procedures to be applied during the maintenance activity.</li> <li>• Explain how to resolve the common problems encountered during the maintenance of the instrumentation and control system.</li> <li>• Explain how to adopt a systematic Plan-Do-Check-Act (PDCA) approach for solving problems and improving business.</li> <li>• Explain the importance of making process improvements by engaging the relevant stakeholders.</li> <li>• Explain how to create and update the SOPs, maintenance schedules and plans.</li> <li>• Explain the techniques used to communicate information using visual control systems such as card systems, colour coding, floor footprints, graphs and charts, team boards, tool/equipment shadow boards, etc.</li> <li>• Describe the process of carrying out different types of maintenance such as preventive, corrective, predictive and reactive maintenance, and the activities these entail.</li> <li>• Explain the benefits and methods of resource optimisation.</li> </ul>	
<p><b>Classroom Aids</b></p>	
<p>Training Kit (Trainer Guide, Presentations). Whiteboard, Marker, Projector, Laptop</p>	
<p><b>Tools, Equipment and Other Requirements</b></p>	
<p>Sensors, Transmitters, Converters, Indicators, Analysers, Controllers, Power Supplies, Removable Circuit Boards, Absolute Gauge, Orifice Plate, Venturi Tube, Pressure Cell, Load Cells, Thermo Couples, Fiscal Metering Equipment, Speed Control Equipment, Speed Measurement Equipment, Vibration Switches, Proximity Probes, Linear Variable Differential Transducer, Oxygen Analyzer, Telemetry Systems, Potentiometer, Multimeter, Cathode Ray Oscilloscope</p>	

## Annexure

### Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training Experience		Remarks
		Years	Specialization	Years	Specialization	
Diploma /Degree	Diploma /Degree in Mechanical Engineering	4	Technician Instrumentation	0		Practical skills and knowledge required in the relevant field

Trainer Certification	
Domain Certification	Platform Certification
Certified for Job Role: “ <b>Technician Instrumentation</b> ” mapped to QP: “CSC/Q0802, v1.0”. Minimum accepted score is 80%	Recommended that the Trainer is certified for the Job Role: “Trainer”, mapped to the Qualification Pack: “MEP/Q0102”. Minimum accepted as per respective SSC guidelines is 80%.

## Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	Specialization	Relevant Industry Experience		Training/Assessment Experience		Remarks
		Years	Specialization	Years	Specialization	
Diploma /Degree	Diploma /Degree in Mechanical Engineering	4	Technician Instrumentation	0		Practical skills and knowledge required in the relevant field

Assessor Certification	
Domain Certification	Platform Certification
Certified for Job Role: <b>“Technician Instrumentation”</b> mapped to QP: “CSC/Q0802, v1.0”. Minimum accepted score is 80%	Certified for the Job Role: “Assessor”, mapped to the Qualification Pack: “MEP/Q2701, v1.0”, with a minimum score of 80%.

## Assessment Strategy

### 1. Assessment System Overview:

- Batches assigned to the assessment agencies for conducting the assessment on SDMS/SIP or email
- Assessment agencies send the assessment confirmation to VTP/TC looping SSC
- The assessment agency deploys the ToA certified Assessor for executing the assessment
- SSC monitors the assessment process & records

### 2. Testing Environment

To ensure a conducive environment for conducting a test, the trainer will:

- Confirm that the centre is available at the same address as mentioned on SDMS or SIP
- Check the duration of the training.
- Check the Assessment Start and End time to be 10 a.m. and 5 p.m. respectively
- Ensure there are 2 Assessors if the batch size is more than 30.
- Check that the allotted time to the candidates to complete Theory & Practical Assessment is correct.
- Check the mode of assessment—Online (TAB/Computer) or Offline (OMR/PP).
- Confirm the number of TABs on the ground are correct to execute the Assessment smoothly.
- Check the availability of the Lab Equipment for the particular Job Role.

### 3. Assessment Quality Assurance levels / Framework:

- Question papers created by the Subject Matter Experts (SME)
- Question papers created by the SME verified by the other subject Matter Experts
- Questions are mapped with NOS and PC
- Question papers are prepared considering that levels 1 to 3 are for the unskilled & semi-skilled individuals, and levels 4 and above are for the skilled, supervisor & higher management
- The assessor must be ToA certified and the trainer must be ToT Certified
- The assessment agency must follow the assessment guidelines to conduct the assessment

### 4. Types of evidence or evidence-gathering protocol:

- Time-stamped & geotagged reporting of the assessor from assessment location
- Centre photographs with signboards and scheme-specific branding
- Biometric or manual attendance sheet (stamped by TP) of the trainees during the training period
- Time-stamped & geotagged assessment (Theory + Viva + Practical) photographs & videos

### 5. Method of verification or validation:

To verify the details submitted by the training centre, the assessor will undertake:

- A surprise visit to the assessment location
- A random audit of the batch
- A random audit of any candidate

### 6. Method for assessment documentation, archiving, and access

To protect the assessment papers and information, the assessor will ensure:

- Hard copies of the documents are stored



- Soft copies of the documents & photographs of the assessment are uploaded/accessed from Cloud Storage
- Soft copies of the documents & photographs of the assessment are stored on the Hard drive

# References

## Glossary

Term	Description
<b>Declarative knowledge</b>	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.
<b>Key Learning</b>	The 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).
<b>OJT (M)</b>	On-the-job training (Mandatory); trainees are mandated to complete specified hours of training on-site
<b>OJT (R)</b>	On-the-job training (Recommended); trainees are recommended the specified hours of training on-site
<b>Procedural Knowledge</b>	Procedural knowledge addresses how to do something, or how to perform a
<b>Training Outcome</b>	Training outcome is a statement of what a learner will know, understand and be able to do <b>upon the completion of the training</b> .
<b>Terminal Outcome</b>	The terminal outcome is a statement of what a learner will know, understand and be able to do <b>upon the completion of a module</b> . A set of terminal outcomes help to achieve the training outcome.

## Acronyms and Abbreviations

Term	Description
<b>NOS</b>	National Skills Qualification Committee
<b>NSQF</b>	National Skills Qualification Framework
<b>OJT</b>	On-the-Job Training
<b>OMR</b>	Optical Mark Recognition
<b>PC</b>	Performance Criteria
<b>PwD</b>	Persons with Disabilities
<b>QP</b>	Qualification Pack
<b>SDMS</b>	Skill Development & Management System
<b>SIP</b>	Skill India Portal
<b>SSC</b>	Sector Skill Council
<b>TC</b>	Trainer Certificate
<b>ToA</b>	Training of Assessors
<b>ToT</b>	Training of Trainers
<b>TP</b>	Training Provider