# Model Curriculum

**QP Name: Automotive  Smart Manufacturing Specialist**

**QP Code: ASC/Q8308**

**QP Version: 1.0**

**NSQF Level: 7**

**Model Curriculum Version: 1.0**

Automotive Skills Development Council | 153, Gr Floor, Okhla Industrial Area, Phase – III, Leela Building, New Delhi – 110020

# Table of Contents

# Training Parameters

| Sector | Automotive |
|---|---|
| Sub-Sector | Manufacturing |
| Occupation | Automotive Product Development |
| Country | India |
| NSQF Level | 7 |
| Aligned to NCO/ISCO/ISIC Code | NCO-2015/NIL |
| Minimum Educational Qualification and Experience | M.E./M.Tech in the relevant field with 2 Years of relevant experience OR B.E./B.Tech (in relevant field) with 5 Years of relevant experience, OR 3 years Diploma (Mechanical/Automobile/ Electrical / Electronics) after class 12th from recognized regulatory body with 6 years of relevant experience OR Certificate-NSQF (Automotive Smart Manufacturing Engineer Level 6) with 3 Years of relevant experience |
| Pre-Requisite License or Training | |
| Minimum Job Entry Age | 22 years |
| Last Reviewed On | 28th July, 2022 |
| Next Review Date | 28th July, 2025 |
| NSQC Approval Date | 28th July, 2022 |
| QP Version | 1.0 |
| Model Curriculum Creation Date | 28th July, 2022 |
| Model Curriculum Valid Up to Date | 28th July, 2025 |
| Model Curriculum Version | 1.0 |
| Minimum Duration of the Course | 660 Hours |
| Maximum Duration of the Course | 660 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.

- Prepare and plan financial model and project requirements
- Manage integration of IIOT network system and devices
- Monitor and collect vital machine data using IIOT edge devices.
- Manage installation and commissioning of IIoT hardware on machine and automation systems.
- Work effectively and efficiently as per schedules and timelines.
- Implement safety practices.
- Use resources optimally to ensure less wastage and maximum conservation.
- Communicate effectively and develop interpersonal skills.

## 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 |
|---|---|---|---|---|---|
| **Bridge Module** | | | | | |
| Module 1: Introduction to the role of an Automotive Smart Manufacturing Specialist | 5:00 | 0:00 | | | 5:00 |
| **ASC/N9810: Manage work and resources (Manufacturing)**<br>**NOS Version No. – 1.0**<br>**NSQF Level – 5** | **20:00** | **40:00** | | | **60:00** |
| Module 2: Manage work and resources according to safety and conservation standards | 20:00 | 40:00 | | | 60:00 |
| **ASC/N9812 – Interact effectively with team, customers and others**<br>**NOS Version No. 1.0**<br>**NSQF Level 5** | **20:00** | **35:00** | | | **55:00** |
| Module 3: Communicate effectively and efficiently | 20:00 | 35:00 | | | 55:00 |
| **ASC/N8323 – Prepare financial model and plan project requirements**<br>**NOS Version No. – 1.0**<br>**NSQF Level - 7** | **15:00** | **75:00** | **90:00** | | **180:00** |
| Module 4: Prepare financial model and plan project requirements | 15:00 | 75:00 | 90:00 | | 180:00 |

| | | | | | |
|---|---|---|---|---|---|
| **ASC/N8324– Manage development of IIOT devices and networking systems**<br>**NOS Version No. –1.0**<br>**NSQF Level - 7** | **15:00** | **75:00** | **90:00** | | **180:00** |
| Module 5: Manage development of IIOT devices and networking systems | 15:00 | 75:00 | 90:00 | | 180:00 |
| **ASC/N8325 – Manage installation and commissioning of IIoT hardware on machine and automation systems**<br>**NOS Version No. –1.0**<br>**NSQF Level - 7** | **15:00** | **75:00** | **90:00** | | **180:00** |
| Module 6: Manage installation and commissioning of IIoT hardware on machine and automation systems | 15:00 | 75:00 | 90:00 | | 180:00 |
| **Total Duration** | **90:00** | **300:00** | **270:00** | | **660:00** |

# Module Details

## Module 1: Introduction to the role of an Automotive Smart Manufacturing Specialist

### Bridge module

**Terminal Outcomes:**

- Discuss the role and responsibilities of an Automotive Smart Manufacturing Specialist.

| Duration: *<05:00>* | Duration: *<00:00>* |
|---|---|
| **Theory – Key Learning Outcomes** | **Practical – Key Learning Outcomes** |
| <ul><li>List the role and responsibilities of an Automotive Smart Manufacturing Specialist.</li><li>Discuss the job opportunities for an Automotive Smart Manufacturing Specialist in the automobile industry.</li><li>Explain about Indian automobile manufacturing market.</li><li>List various automobile Original Equipment Manufacturers (OEMs) and different products/ models manufactured by them.</li><li>Discuss automation and manufacturing standards and procedures followed in the company.</li></ul> | |
| **Classroom Aids:** | |
| Whiteboard, marker pen, projector | |
| **Tools, Equipment and Other Requirements** | |
| | |

# Module 2: Manage work and resources according to safety and conservation standards

## Mapped to ASC/N9810, v1.0

**Terminal Outcomes:**

- Employ appropriate ways to maintain safe and secure working environment
- Apply material and energy conservation practices at the workplace.

| Duration: <20:00> | Duration: <40:00> |
|---|---|
| **Theory – Key Learning Outcomes** | **Practical – Key Learning Outcomes** |
| <ul><li>Discuss organisational procedures for health, safety and security and individual role and responsibilities related to the same.</li><li>List the potential workplace related risks, threats and hazards, their causes and preventions.</li><li>List personal protective equipment like safety gloves, glasses, shoes and mask used at the workplace.</li><li>List various types of fire extinguisher.</li><li>Identify various safety boards/ signs placed on the shop floor.</li><li>Explain 5S standards, procedures and policies followed at workplace.</li><li>Discuss organisational procedures to deal with emergencies and accidents at the workplace and importance of following them.</li><li>State the importance of conducting safety drills or training sessions.</li><li>Explain the process of filling daily check sheet for reporting to the concerned authorities about improvements done and risks identified.</li><li>Discuss how and when to report about potential hazards identified in the workplace and limits of responsibility for dealing with them.</li><li>Outline the importance of keeping workplace, equipment, restrooms etc. clean and sanitised.</li><li>Explain the importance of following hygiene and sanitation regulations developed by organisation at the workplace.</li><li>Discuss the importance of maintaining the availability of running water, hand wash and alcohol-based sanitizers at the</li></ul> | <ul><li>Apply appropriate ways to implement safety practices to ensure safety of people at the workplace.</li><li>Display the correct way of wearing and disposing PPE.</li><li>Demonstrate the use of fire extinguisher.</li><li>Demonstrate how to provide first aid procedure in case of emergencies.</li><li>Demonstrate how to evacuate the workplace in case of an emergency.</li><li>Employ various techniques for checking malfunctions in the machines with the support of maintenance team and as per Standard Operating Procedures (SOP).</li><li>Demonstrate to arrange tools/ equipment/ fasteners/ spare parts into proper trays, cabinets, lockers as mentioned in the 5S guidelines/work instructions.</li><li>Apply appropriate ways to organise safety drills or training sessions for others on the identified risks and safety practices.</li><li>Prepare a report about the health, safety and security breaches.</li><li>Apply appropriate ways to check that workplace, equipment, restrooms etc. are cleaned and sanitised.</li><li>Role play a situation to brief the team about the hygiene and sanitation regulations developed by organisation.</li><li>Demonstrate the correct way of washing hands using soap and water and alcohol-based hand rubs.</li><li>Apply appropriate methods to support the employees to cope with stress, anxiety etc.</li><li>Demonstrate proper waste collection and disposal mechanism depending upon types of waste.</li></ul> |

| | |
|---|---|
| workplace. | • Perform the steps involved in storage of tools, equipment and material after completion of work. |
| • Discuss the significance of conforming to basic hygiene practices such as washing hands, using alcohol based hand sanitizers or soap. | • Employ appropriate ways to resolve malfunctioning (fumes/ sparks/ emission/ vibration/ noise) and lapse in maintenance of equipment as per requirements. |
| • Recall ways of reporting advanced hygiene and sanitation issues to the concerned authorities. | • Perform the steps to prepare a sample material and energy audit reports. |
| • Elucidate various stress and anxiety management techniques. | • Employ practices for efficient utilization of material and energy/electricity. |
| • Discuss the significance of greening. | |
| • Classify different categories of waste for the purpose of segregation. | |
| • Differentiate between recyclable and non-recyclable waste. | |
| • Discuss various methods of waste collection and disposal. | |
| • List the various materials used at the workplace. | |
| • Explain organisational recommended norms for storage of tools, equipment and material. | |
| • Discuss the importance of efficient utilisation of material and water. | |
| • Explain basics of electricity and prevalent energy efficient devices. | |
| • Explain the processes to optimize usage of material and energy/electricity. | |
| • Enlist common practices for conserving electricity at workplace. | |

**Classroom Aids:**

Whiteboard, marker pen, projector

**Tools, Equipment and Other Requirements**

- Housekeeping material: Cleaning agents, cleaning cloth, waste container, dust pan and brush set, liquid soap, hand towel, fire extinguisher
- Safety gears: Safety shoes, ear plug, goggles, gloves, helmet, first-aid kit

# Module 3: Communicate Effectively and Efficiently

## *Mapped to ASC/N9812, v1.0*

**Terminal Outcomes:**

- Use effective communication and interpersonal skills.
- Apply sensitivity while interacting with different genders and people with disabilities.

| **Duration**: *<20:00>* | **Duration**: *<35:00>* |
|---|---|
| **Theory – Key Learning Outcomes** | **Practical – Key Learning Outcomes** |
| • Explain the importance of complying with organizational requirements to share information with team members.<br>• Discuss the ways to adjust the communication styles to reflect sensitivity towards gender and persons with disability (PwD).<br>• Explain the importance of respecting personal space of colleagues and customers.<br>• Describe the ways to manage and coordinate with team members for work integration.<br>• State the importance of team goals over individual goals, keeping commitment made to team members, and informing them in case of delays.<br>• Discuss the importance of following the organisation's policies and procedures<br>• Discuss the importance of rectifying errors as per feedback and minimizing mistakes.<br>• Discuss gender-based concepts, issues and legislation as well organization standards, guidelines, rights and duties of PwD.<br>• Discuss the importance of PwD and gender sensitization to ensure that team shows sensitivity towards them.<br>• State the importance of following organizational standards and guidelines related to PwD.<br>• Recall the rights and duties at workplace with respect to PwD.<br>• Outline organisation policies and procedures pertaining to written and verbal communication. | • Employ different means and methods of communication depending upon the requirement to interact with the team members.<br>• Employ appropriate ways to maintain good relationships with team members and superiors.<br>• Apply appropriate techniques to resolve conflicts and manage team members for smooth workflow.<br>• Conduct training sessions to train the team members on proper reporting of completed work and receiving feedback.<br>• Employ suitable ways to escalate problems to superiors as and when required.<br>• Prepare a sample report on the progress and team performance .<br>• Role play a situation on how to offer help to people with disability (PwD) if required at work. |
| **Classroom Aids:** | |
| Whiteboard/blackboard, marker/chalk, duster, computer or Laptop attached to LCD projector | |
| **Tools, Equipment and Other Requirements** | |
| | |

## Module 4: Prepare financial model and plan project requirements

### Mapped to ASC/N8323, v1.0

**Terminal Outcomes:**
- Perform steps to prepare financial model for the execution of IIOT project.
- Perform steps to identify requirements for the execution of IIOT project.

| **Duration**: *<15:00>* | **Duration**: *<75:00>* |
| --- | --- |
| **Theory – Key Learning Outcomes** | **Practical – Key Learning Outcomes** |
| • Discuss the information obtained from mechanical drawings and layout diagram related to project's module design.<br>• List the requirements of the IIoT network, sensors, components, type of materials etc. to form an IoT network infrastructure based on the needs of the IoT solution.<br>• Discuss the selection criteria of appropriate technology, devices, sensors, specific hardwares, components, type of materials, and deployment model as per the requirements of the IoT network for smart manufacturing process.<br>• Describe the characteristics of various deployment models, network topologies, and connection types.<br>• Discuss the selection criteria of core and auxiliary support process as per the requirements of the IoT network for smart manufacturing process.<br>• Elaborate layout of project execution, outline of the development process and its requirements and project execution models.<br>• Discuss ways to prepare cost list to execute the project, timeline and resource requirements of the project.<br>• Describe network topologies, wired and wireless technologies, fiber optics, etc.<br>• Describe the characteristics of wired/ wireless connectivity protocols for device-device or device-gateway communications (this may include protocols such as NFC, NB-IoT, Bluetooth/BLE, ZigBee, Mesh, and Lora).<br>• Describe the characteristics of connectivity protocols for device-cloud communications (this may include protocols such as 5G, Wi-Fi, GSM, GPRS, and Satellite). | • Show how to evaluate the components and connections that form an IoT network infrastructure based on the needs of the IoT solution.<br>• Perform steps to prepare a layout of project execution, outline of the development process and its requirements, project execution models¸ cost list to execute the project, timeline and resource requirements considering the technology, cost and resources required.<br>• Apply appropriate ways to conduct survey and identify the need of modification in existing systems and requirements of new machines and automation systems as per the project execution model and integration of IIoT sensor or IO-Links.<br>• Apply appropriate ways to identify the requirements of new components or machines or replacements to upgrade for full filling the legacy compatibility.<br>• Show how to identify suitable network modules, communication protocols and devices, required additional systems and passive materials for developing the industrial standard network. |

| **Classroom Aids:** |
|---|
| Whiteboard, marker pen, projector |

| **Tools, Equipment and Other Requirements** |
|---|
| PCs/Laptops, Internet with Wi-Fi (Min2 Mbps Dedicated)<br>Tools and Programming Languages:<br>• Wired/wireless connectivity protocols for device-device or device-gateway communications such as NFC, NB-IoT, Bluetooth/BLE, ZigBee, Mesh and Lora<br>• Wired/wireless connectivity protocols for device-cloud communications such as 5G, Wi-Fi, GSM, GPRS and Satellite<br>• Routing protocols such as RIP, OSPF, EIGRP, BGP and IP services (QoS, NAT etc) and L2/L3 VPNs • IoT Platforms such as Watson IoT, GE Predix, PTC Thingworx, AWS IoT, Azure IoT, Eclipse IoT, DeviceHub, Arduino, Raspberry Pi<br>• • Documentation tools such as Adobe and MS-Word |

# Module 5: Manage development of IIOT devices and networking systems

## Mapped to ASC/N8324, v1.0

**Terminal Outcomes:**

- Perform the steps for the development of IIOT devices and networking systems.
- Demonstrate organisational procedure of testing and optimizing the IIOT devices and networking systems.

| Duration: *<15:00>* | Duration: *<75:00>* |
|---|---|
| **Theory – Key Learning Outcomes** | **Practical – Key Learning Outcomes** |
| • List the requirements of the IIoT network, sensors, components, type of materials etc. to form an IoT network infrastructure based on the needs of the IoT solution.<br>• Describe the characteristics of various deployment models, network topologies, and connection types.<br>• Describe network topologies, wired and wireless technologies, fiber optics, etc.<br>• Explain functioning of network management dashboards and their applications.<br>• Describe the characteristics of wired/ wireless connectivity protocols for device-device or device-gateway communications (this may include protocols such as NFC, NB-IoT, Bluetooth/BLE, ZigBee, Mesh, and Lora).<br>• Describe the characteristics of connectivity protocols for device-cloud communications (this may include protocols such as 5G, Wi-Fi, GSM, GPRS, and Satellite).<br>• Discuss the need of strict communication requirements to be followed during development of firmware for EDGE devices.<br>• Describe the selection criteria of development environment and programming language for coding and retrieving data from DBMS.<br>• Explain Application Programming Interfaces (APIs).<br>• Discuss the need of defining priority tasks for the EDGE devices and optimizing them in firmware level.<br>• Discuss the importance of security standard and encryptions in the EDGE boards and DATA links. | • Show how to identify the number of EDGE nodes required with respect to the number of edge devices, sensors, data traffic, packet data size and locations of IIoT elements at Zone zero.<br>• Show how to design IO-Link system for switch console as per design requirements.<br>• Show how to define the suitable data packet size for lower bandwidth and low latency.<br>• Apply appropriate ways to optimize the nodes with respect to the no. of sensors and their communication frequency, and packet data size and traffic for faster communication.<br>• Show how to define the strict communication requirements to be followed during development of firmware for EDGE devices.<br>• Apply appropriate ways to design effective and efficient solutions to gain a thorough grasp of the website's performance demands and goals.<br>• Perform steps to develop and administer Application Programming Interfaces (APIs) for the system.<br>• Apply appropriate methods to write and test development solutions for code-related problems.<br>• Show how to identify different communication protocols for wire and wireless connectivity for gateways, IIoT sensors and IO-Links.<br>• Show how to define priority tasks for the EDGE devices and optimize them in firmware level.<br>• Show how to identify and define the required security standard and |

| | |
|---|---|
| • Describe RF shielding and Electromagnetic shielding for the EDGE devices.<br>• List the requirements of additional backup power supplies, local data storing, acyclic configurations, and failsafe condition.<br>• Describe the selection criteria of hardware and soft tools for development of industry standard communication. | encryptions in the EDGE boards and DATA links.<br>• Show how to define electrical wiring conditions and limitations of sensors and IO-Links with EDGE devices.<br>• Show how to identify and define RF shielding and Electromagnetic shielding for the EDGE devices and the connected sensors and Links.<br>• Apply appropriate ways to monitor the test results in between the development of the hardware, firmware and Dashboards to understand its feasibility and optimization.<br>• Perform steps to develop the communication with the required protocols, security and encryptions.<br>• Apply appropriate methods to test the communication system with the IIoT hardware to identify the congestion possibilities.<br>• Apply appropriate ways to optimize bandwidth requirements and power requirements with backup for seamless and stable network connectivity. |

**Classroom Aids:**

Whiteboard, marker pen, projector

**Tools, Equipment and Other Requirements**

PCs/Laptops, Internet with Wi-Fi (Min2 Mbps Dedicated)

18 documents of PPAP, Design records, Design Records, Authorized Engineering Change Documents, Customer Engineering Approval, Design Failure Modes and Effects Analysis (DFMEA), applied in special situations, Process Flow Diagram, Process Failure Modes and Effects Analysis (PFMEA) Control Plan, Part Submission Warrant (PSW), Engineering Change Documents

Dimensional Results, PLC Simulator, Hydraulic, Pneumatic, Electronic Control Systems Simulator, Internet of Things study material and IOT communication devices, Manufacturing Execution system, manufacturing operation management system.

Hydraulics and pneumatics systems simulator, PLC Simulator with required software, Air Cylinders, valves, connector/tubing simulators, Pick and place robots assembly

Electronics sensor like proximity, optical, magnetic sensors.

## Module 6: Manage installation and commissioning of IIoT hardware on machine and automation systems

### Mapped to ASC/N8325, v1.0

**Terminal Outcomes:**

- Perform the steps to install and commission the IIoT hardware on machine and automation systems.
- Demonstrate organisational procedure of testing and verifying the IIoT hardware on machine and automation systems.

| **Duration**: *<15:00>* | **Duration**: *<75:00>* |
|---|---|
| **Theory – Key Learning Outcomes** | **Practical – Key Learning Outcomes** |
| • Describe testing methods to test the developed network for connectivity and stability and future extension.<br>• List the steps to be performed for installing systems in the pre-planned locations to distribute the network.<br>• Describe testing methods to test the algorithms with example datasets, EDGE computers with the program and firmware and power connectivity and security access to the EDGE devices from both online and offline mode.<br>• List the steps to be performed for to installing the systems and units in enclosed and secure marshalling boxes.<br>• Discuss various reports and data required related to the installation and commissioning of IIoT hardware on machine and automation systems. | • Apply appropriate methods to test the developed network for connectivity and stability and future extension.<br>• Perform steps to install systems in the pre-planned locations to distribute the network for max connectivity and reach.<br>• Apply appropriate methods to test the backup systems and access security.<br>• Perform steps to test the algorithms with example datasets, EDGE computers with the program and firmware and power connectivity and security access to the EDGE devices from both online and offline mode.<br>• Perform steps to install the systems and units in enclosed and secure marshalling boxes.<br>• Apply appropriate ways to verify the physical security and environment of hardware for hassle-free operations.<br>• Apply appropriate ways to verify the installation of sensors, switches, links, with the machines robots and automation systems.<br>• Apply appropriate ways to verify the connections of IIoT transducers, switches, IO-Links, tags from the machines, robots and automated and non-automated systems with the EDGE devices.<br>• Apply appropriate ways to verify the data accusation from the IIoT systems in local level to check the reliability and repeatability.<br>• Show how to configure the EDGE computers and devices as per the IIoT network configuration.<br>• Apply appropriate ways to verify the |

| | connections to the network and its stability. |
| | • Apply appropriate methods to test the data efficient transmission from the Zone Zero machines and systems to the EDGE servers. |
| | • Prepare sample report on latency and bandwidth. |
| | • Show how to generate the cold data to test the connectivity, latency, packet size, and bandwidth. |
| | • Apply appropriate methods to test the data processing tools with cold data and different sample sets to test its alarm and warnings, process output, processing time, command and control latency. |
| | • Demonstrate organisational procedure of commission the IIoT hardware on machine and automation systems. |

| **Classroom Aids:** |
| --- |
| Whiteboard, marker pen, projector |

| **Tools, Equipment and Other Requirements** |
| --- |
| PCs/Laptops, Internet with Wi-Fi (Min2 Mbps Dedicated) |
| 18 documents of PPAP, Design records, Design Records, Authorized Engineering Change Documents, Customer Engineering Approval, Design Failure Modes and Effects Analysis (DFMEA), applied in special situations, Process Flow Diagram, Process Failure Modes and Effects Analysis (PFMEA) Control Plan, Part Submission Warrant (PSW), Engineering Change Documents |
| Dimensional Results, PLC Simulator, Hydraulic, Pneumatic, Electronic Control Systems Simulator, Internet of Things study material and IOT communication devices, Manufacturing Execution system, manufacturing operation management system. |
| Hydraulics and pneumatics systems simulator, PLC Simulator with required software, Air Cylinders, valves, connector/tubing simulators, Pick and place robots assembly |
| Electronics sensor like proximity, optical, magnetic sensors. |

# Annexure

## Trainer Requirements

| Trainer Prerequisites | | | | | | |
|---|---|---|---|---|---|---|
| Minimum Educational Qualification | Specialization | Relevant Industry Experience | | Training Experience | | Remarks |
| | | Years | Specialization | Years | Specialization | |
| B.E/B.Tech | Mechanical/ Electrical/ Electronics/ Automobile/ Instrumentation | 5 | Mechanical/ Electrical/ Electronics/ Automobile/ Instrumentation | 1 | Mechanical/ Electrical/ Electronics/ Automobile/ Instrumentation | NA |
| B.E/B.Tech | Mechanical/ Electrical/ Electronics/ Automobile/ Instrumentation | 6 | Mechanical/ Electrical/ Electronics/ Automobile/ Instrumentation | 0 | Mechanical/ Electrical/ Electronics/ Automobile/ Instrumentation | NA |
| M.E/M.Tech | Mechanical/ Electrical/ Electronics/ Automobile/ Instrumentation | 3 | Mechanical/ Electrical/ Electronics/ Automobile/ Instrumentation | 1 | Mechanical/ Electrical/ Electronics/ Automobile/ Instrumentation | NA |

| Trainer Certification | |
|---|---|
| Domain Certification | Platform Certification |
| "Automotive Smart Manufacturing Specialist, ASC/Q8308, version 1.0". Minimum accepted score is 80%. | "Trainer, MEP/Q2601 v1.0" Minimum accepted score is 80%. |

## Assessor Requirements

| Assessor Prerequisites | | | | | | |
|---|---|---|---|---|---|---|
| **Minimum Educational Qualification** | **Specialization** | **Relevant Industry Experience** | | **Training Experience** | | **Remarks** |
| | | *Years* | *Specialization* | *Years* | *Specialization* | |
| B.E/B.Tech | Mechanical/ Electrical/ Electronics/ Automobile/ Instrumentation | 6 | Mechanical/ Electrical/ Electronics/ Automobile/ Instrumentation | 1 | Mechanical/ Electrical/ Electronics/ Automobile/ Instrumentation | NA |
| B.E/B.Tech | Mechanical/ Electrical/ Electronics/ Automobile/ Instrumentation | 7 | Mechanical/ Electrical/ Electronics/ Automobile/ Instrumentation | 0 | Mechanical/ Electrical/ Electronics/ Automobile/ Instrumentation | NA |
| M.E/M.Tech | Mechanical/ Electrical/ Electronics/ Automobile/ Instrumentation | 4 | Mechanical/ Electrical/ Electronics/ Automobile/ Instrumentation | 1 | Mechanical/ Electrical/ Electronics/ Automobile/ Instrumentation | NA |

| Assessor Certification | |
|---|---|
| **Domain Certification** | **Platform Certification** |
| "Automotive Smart Manufacturing Specialist, ASC/Q8308, version 1.0". Minimum accepted score is 80%. | "Assessor; MEP/Q2701 v1.0" Minimum accepted score is 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
   - Assessment agency deploys the ToA certified Assessor for executing the assessment
   - SSC monitors the assessment process & records

2. Testing Environment:
   - 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 as 10 a.m. and 5 p.m.
   - If the batch size is more than 30, then there should be 2 Assessors.
   - 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 level 1 to 3 are for the unskilled & semi-skilled individuals, and level 4 and above are for the skilled, supervisor & higher management
   - Assessor must be ToA certified & trainer must be ToT Certified
   - 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:
   - Surprise visit to the assessment location
   - Random audit of the batch
   - Random audit of any candidate

6. Method for assessment documentation, archiving, and access
- 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 in the Hard Drives

# 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

| NOS | National Occupational Standard(s) |
|------|------|
| NSQF | National Skills Qualifications Framework |
| QP | Qualifications Pack |
| TVET | Technical and Vocational Education and Training |
| SOP | Standard Operating Procedure |
| WI | Work Instructions |
| PPE | Personal Protective equipment |