Model Curriculum

QP Name: Automotive Robotics System Integrator/Planner

QP Code: ASC/Q8304

QP Version: 1.0

NSQF Level: 6

Model Curriculum Version: 1.0

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

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Training Parameters

Sector	Automotive
Sub-Sector	Manufacturing
Occupation	Automotive Product Development
Country	India
NSQF Level	6
Aligned to NCO/ISCO/ISIC Code	NCO-2015/1223.0102ÿ
Minimum Educational Qualification and Experience	M.E./M.Tech in the relevant field with 1 year of relevant experience OR B.E./B.Tech in the relevant field with 2 years of relevant experience, OR 3 years Diploma (Mechanical/Automobile/ Electrical / Electronics) from recognized regulatory body after class 12th with 4 years of relevant experience OR Certificate-NSQF (Automotive Prototype Manufacturing Lead Technician Level 5) with 3 Years of relevant experience
Pre-Requisite License or Training	NA
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	570 Hours
Maximum Duration of the Course	570 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.

- Perform identification of product feasibility and setup requirements.
- Perform selection and setup of end-effector and robot
- Perform integration of robots and automation system
- Perform installation and commissioning of robots and automation system
- 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 Robotics System Integrator/Planner	5:00	0:00			5:00
ASC/N9810: Manage work and resources (Manufacturing) NOS Version No. – 1.0 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 NOS Version No. 1.0 NSQF Level 5	**20:00**	**35:00**			**55:00**
Module 3: Communicate effectively and efficiently	20:00	35:00			55:00
ASC/N8316 – Identify product feasibility and setup requirements NOS Version No. –1.0 NSQF Level - 6	**10:00**	**35:00**	**45:00**		**90:00**
Module 4: Identify product feasibility and setup requirements	10:00	35:00	45:00		90:00

ASC/N8317 – Selection and setup of end-effector and robot NOS Version No. –1.0 NSQF Level - 6	**10:00**	**35:00**	**45:00**		**90:00**
Module 5: Selection and setup of end-effector and robot	10:00	35:00	45:00		90:00
ASC/N8318 – Installation, commissioning and integration of robot system NOS Version No. –1.0 NSQF Level - 6	**10:00**	**50:00**	**90:00**		**150:00**
Module 6: Installation, commissioning and integration of robot system	10:00	50:00	90:00		150:00
ASC/N8319 – Robot/Cobot programming and application testing NOS Version No. –1.0 NSQF Level - 6	**15:00**	**45:00**	**60:00**		**120:00**
Module 7: Robot/Cobot programming and application testing	15:00	45:00	60:00		120:00
Total Duration	**90:00**	**240:00**	**240:00**		**570:00**

Module Details

Module 1: Introduction to the role of an Automotive Robotics System Integrator/Planner

Bridge module

Terminal Outcomes:

- Discuss the role and responsibilities of an Automotive Robotics System Integrator/Planner.

Duration: *<05:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• List the role and responsibilities of an Automotive Robotics System Integrator/ Planner. • Discuss the job opportunities for an Automotive Robotics System Integrator/ Planner in the automobile industry. • Explain about Indian automobile manufacturing market. • List various automobile Original Equipment Manufacturers (OEMs) and different products/ models manufactured by them. • Discuss automation and manufacturing standards and procedures followed in the company.	
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**
• Discuss organisational procedures for health, safety and security and individual role and responsibilities related to the same. • List the potential workplace related risks, threats and hazards, their causes and preventions. • List personal protective equipment like safety gloves, glasses, shoes and mask used at the workplace. • List various types of fire extinguisher. • Identify various safety boards/ signs placed on the shop floor. • Explain 5S standards, procedures and policies followed at workplace. • Discuss organisational procedures to deal with emergencies and accidents at the workplace and importance of following them. • State the importance of conducting safety drills or training sessions. • Explain the process of filling daily check sheet for reporting to the concerned authorities about improvements done and risks identified. • Discuss how and when to report about potential hazards identified in the workplace and limits of responsibility for dealing with them. • Outline the importance of keeping workplace, equipment, restrooms etc. clean and sanitised. • Explain the importance of following hygiene and sanitation regulations developed by organisation at the workplace. • Discuss the importance of maintaining the availability of running water, hand wash and alcohol-based sanitizers at the	• Apply appropriate ways to implement safety practices to ensure safety of people at the workplace. • Display the correct way of wearing and disposing PPE. • Demonstrate the use of fire extinguisher. • Demonstrate how to provide first aid procedure in case of emergencies. • Demonstrate how to evacuate the workplace in case of an emergency. • Employ various techniques for checking malfunctions in the machines with the support of maintenance team and as per Standard Operating Procedures (SOP). • Demonstrate to arrange tools/ equipment/ fasteners/ spare parts into proper trays, cabinets, lockers as mentioned in the 5S guidelines/work instructions. • Apply appropriate ways to organise safety drills or training sessions for others on the identified risks and safety practices. • Prepare a report about the health, safety and security breaches. • Apply appropriate ways to check that workplace, equipment, restrooms etc. are cleaned and sanitised. • Role play a situation to brief the team about the hygiene and sanitation regulations developed by organisation. • Demonstrate the correct way of washing hands using soap and water and alcohol-based hand rubs. • Apply appropriate methods to support the employees to cope with stress, anxiety etc. • Demonstrate proper waste collection and disposal mechanism depending upon types of waste.

workplace. • Discuss the significance of conforming to basic hygiene practices such as washing hands, using alcohol based hand sanitizers or soap. • Recall ways of reporting advanced hygiene and sanitation issues to the concerned authorities. • Elucidate various stress and anxiety management techniques. • 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.	• Perform the steps involved in storage of tools, equipment and material after completion of work. • Employ appropriate ways to resolve malfunctioning (fumes/ sparks/ emission/ vibration/ noise) and lapse in maintenance of equipment as per requirements. • Perform the steps to prepare a sample material and energy audit reports. • Employ practices for efficient utilization of material and energy/electricity.
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. • Discuss the ways to adjust the communication styles to reflect sensitivity towards gender and persons with disability (PwD). • Explain the importance of respecting personal space of colleagues and customers. • Describe the ways to manage and coordinate with team members for work integration. • State the importance of team goals over individual goals, keeping commitment made to team members, and informing them in case of delays. • Discuss the importance of following the organisation's policies and procedures • Discuss the importance of rectifying errors as per feedback and minimizing mistakes. • Discuss gender-based concepts, issues and legislation as well organization standards, guidelines, rights and duties of PwD. • Discuss the importance of PwD and gender sensitization to ensure that team shows sensitivity towards them. • State the importance of following organizational standards and guidelines related to PwD. • Recall the rights and duties at workplace with respect to PwD. • 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. • Employ appropriate ways to maintain good relationships with team members and superiors. • Apply appropriate techniques to resolve conflicts and manage team members for smooth workflow. • Conduct training sessions to train the team members on proper reporting of completed work and receiving feedback. • Employ suitable ways to escalate problems to superiors as and when required. • Prepare a sample report on the progress and team performance . • 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: Identify product feasibility and setup requirements

Mapped to ASC/N8316, v1.0

Terminal Outcomes:

- Perform the steps of product feasibility check.
- Demonstrate organisational procedure of identifying product requirements.

Duration: *<10:00>*	**Duration**: *<35:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Discuss the information obtained from the documents like need analysis, feasibility, technical specification and process flow diagram, product drawings and other engineering documents. • Discuss the selection criteria of automation elements in align with electrical, mechanical and environmental parameters. • List all the components to be joined in a particular production cell. • Discuss core and auxiliary support process required during automation process. • Discuss the information obtained from assembly plan and Production/ Assembly documents. • Describe sequence of operations for the integration activities. • Describe Standard work cycle. • Discuss potential failures in process. • Describe process repeatability and cycle time. • Discuss the records and documents needed to be prepared as a reference for future development.	• Employ appropriate ways to design / interpret the project design from the product drawings and other engineering documents. • Demonstrate Standard operation procedures recommended by manufacturer for using equipment / machinery. • Show how to identify inputs and outputs in a robotic cell. • Prepare sample assembly plan and sequence of operations for the integration activities. • Plan material loading and unloading sequence in the robotic cell. • Apply appropriate ways to collect production volume, product size and data of available time for the production. • Apply appropriate ways to calculate total work to be done to size the production line. • Show how to interpret the application to be implemented on robotic system and identify jigs/fixture and equipment required for integration. • Show how to identify machine type and equipment to be used in the application. • Prepare list of specification and quantity of material required and Process Flow Diagram for the process. • Apply appropriate ways to identify potential failures in process. • Perform steps to calculate payload of the process for robot selection. • Apply appropriate ways to identify process repeatability and cycle time.
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 5: Selection and setup of end-effector and robot

Mapped to ASC/N8317, v1.0

Terminal Outcomes:

- Perform preparatory activities like selection of robot and EOAT.
- Demonstrate organisational procedure of selection and setup of end-effector and robot.

Duration: *<10:00>*	**Duration**: *<35:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Discuss the information obtained from the project document related to the robots and automation system requirements. • Discuss the information obtained from manual and technical specification of robots. • Describe the selection criteria of industrial robot based on applications, robot types and technical parameters. • Describe reachability and accuracy requirements of the robot in application. • Describe types of end effector and their selection criteria. • Describe zoning area and stroke area of robot. • List application controllers and external I/O devices required. • Describe the functioning and use of components of robotic cell like robot, tip dressers, jigs/fixture/grippers, Docking units, sensor and cable trays etc. • Describe tolerance & matching quality fit and finish. • List the steps to be performed for robot integration with automation elements.	• Employ appropriate ways to design / interpret the project document from the information related to robots and automation system requirements. • Apply appropriate ways to determine reachability and accuracy requirements of the robot in application. • Show how to determine maximum load of the EOAT. • Show how to identify zoning area and stroke area of robot. • Apply appropriate ways to identify area required for system implementation and availability of power, pneumatic and coolant supply. • Apply appropriate ways to plan material space, trolleys, supply of material to line side & material handling equipment. • Show how to find the position of equipment and finalize robot positions. • Show how to find the place for all the components of robotic cell like robot, tip dressers, jigs/fixture/grippers, docking units, sensor and cable trays etc. • Apply appropriate ways to finalize the required work tables of fixtures, orientation of loading and unloading and material flow in the cell. • Show how to determine the mounting, TCP of equipment.
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: Installation, commissioning and integration of robot system

Mapped to ASC/N8318, v1.0

Terminal Outcomes:

- Perform steps for installation, commissioning and integration of robot system.
- Demonstrate organisational procedure of installation, commissioning and integration of robot system.

Duration: *<10:00>*	**Duration**: *<50:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Describe installation techniques for installation of the robot. • List the steps to be performed for installing the robot system. • List the steps to be performed for integration of robot system with robot. • Discuss the selection criteria of automation elements in align with electrical, mechanical and environmental parameters. • List the steps to be performed for configure and calibrate the robot system. • List the steps to be performed for executing teaching process. • List the steps to be performed for dry run of robot.	• Perform steps to install robot controller, licenses, tool, sensors and pneumatics in the system. • Perform steps to integrate robot controller and robot. • Perform steps to integrate safety fencing and controller panel. • Show how to turn ON the system and operate the robot and do the power check. • Apply appropriate ways to check the functioning of sensors and external device connections with controller. • Perform steps to execute mastering for all servos and identify global and local points. • Show how to configure tool configuration and map the system data. • Perform steps to execute TCP and mount frame on tool. • Apply appropriate ways to calibrate base and marking of readings for future reference. • Perform steps to execute teaching process of robot and teach the path. • Show how to dry-run the robot to check its proper functioning. • Show how to conduct override testing and check motion types in the robot. • Apply appropriate ways to create collision free path of the robot.
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 7: Robot/Cobot programming and application testing

Mapped to ASC/N8319, v1.0

Terminal Outcomes:

- Perform steps for programming of robot system.
- Demonstrate organisational procedure of testing of robot system.

Duration: *<15:00>*	**Duration**: *<45:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Describe programming techniques for programming of the robot. • List the steps to be performed for programming the robot system. • List the steps to be performed for assign application parameters in the program . • List the steps to be performed for application testing and dry run of the robot/cobot. • List the steps to be performed for dry run of robot.	• Perform steps for programming of the robot/cobot. • Show how define sequence of multiple paths/Operation. • Show how to modify path to achieve cycle time. • Perform steps to assign application parameters in the program. • Show how to create logics and insert variables for logical programming. • Perform steps for application testing and dry run of the robot/cobot. • Show how to define parameters of robot application. • Apply appropriate ways to connect application controllers with robot controller. • Apply appropriate ways to estimate the process path and cycle time. • Show how to dry-run the robot to check its proper functioning and finalize the program. • Apply appropriate ways to check the functioning of safety door and interlocking systems. • Show how to apply T2 or AUT mode for checking function of safety fencing. • Show how to dry-run the robot in different operating modes to ensure proper functioning. • Perform steps to execute the operation on real job with all systems active.
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/Automobile/ Electrical/ Electronics	4	Mechanical/ Automobile/ Electronics/ Instrumentation	1	Mechanical/ Automobile/ Electronics/ Instrumentation	NA
B.E/B.Tech	Mechanical/Automobile/ Electrical/ Electronics	5	Mechanical/ Automobile/ Electronics/ Instrumentation	0	Mechanical/ Automobile/ Electronics/ Instrumentation	NA
Diploma	Mechanical/Automobile/ Electrical/ Electronics	3	Mechanical/ Automobile/ Electronics	1	Mechanical/ Automobile/ Electronics	NA
Diploma	Mechanical/Automobile/ Electrical/ Electronics	4	Mechanical/ Automobile/ Electronics	0	Mechanical/ Automobile/ Electronics	NA
M.E/M.Tech	Mechanical/Automobile/ Electrical/ Electronics	2	Mechanical/Automobile/ Electrical/ Electronics	1	Mechanical/Automobile/ Electrical/ Electronics	NA
M.E/M.Tech	Mechanical/Automobile/ Electrical/ Electronics	3	Mechanical/Automobile/ Electrical/ Electronics	0	Mechanical/Automobile/ Electrical/ Electronics	NA

Trainer Certification	
Domain Certification	**Platform Certification**
"Automotive Robotics System Integrator/Planner, ASC/Q8304, 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/Automobile/ Electrical/ Electronics	5	Mechanical/ Automobile/ Electronics/ Instrumentation	1	Mechanical/ Automobile/ Electronics/ Instrumentation	NA
B.E/B.Tech	Mechanical/Automobile/ Electrical/ Electronics	6	Mechanical/ Automobile/ Electronics/ Instrumentation	0	Mechanical/ Automobile/ Electronics/ Instrumentation	NA
Diploma	Mechanical/Automobile/ Electrical/ Electronics	4	Mechanical/ Automobile/ Electronics	1	Mechanical/ Automobile/ Electronics	NA
Diploma	Mechanical/Automobile/ Electrical/ Electronics	5	Mechanical/ Automobile/ Electronics	0	Mechanical/ Automobile/ Electronics	NA
M.E/M.Tech	Mechanical/Automobile/ Electrical/ Electronics	3	Mechanical/Automobile/ Electrical/ Electronics	1	Mechanical/Automobile/ Electrical/ Electronics	NA
M.E/M.Tech	Mechanical/Automobile/ Electrical/ Electronics	4	Mechanical/Automobile/ Electrical/ Electronics	0	Mechanical/Automobile/ Electrical/ Electronics	NA

Assessor Certification	
Domain Certification	**Platform Certification**
"Automotive Robotics System Integrator/Planner, ASC/Q8304, version 1.0". Minimum accepted score is 80%.	"Assessor; MEP/Q2701 v1.0" Minimum accepted score is 80%.

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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