Model Curriculum

QP Name: Electric Vehicle Maintenance Technician

QP Code: ASC/Q6809

QP Version: 1.0

NSQF Level: 4

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	Plant and Equipment Maintenance
Country	India
NSQF Level	4
Aligned to NCO/ISCO/ISIC Code	NCO-2015/3113.0102
Minimum Educational Qualification and Experience	8th Class + 2 years ITI with 2 years of relevant experience OR 10th Class pass with 2 years of relevant experience OR 10th Class + 2 years ITI OR 12th Class with 1 Year of experience OR Certificate-NSQF (Automotive Maintenance Assistant Level 3) with 2 Years of relevant experience
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 years
Last Reviewed On	25/11/2021
Next Review Date	25/11/2024
NSQC Approval Date	25/11/2021
QP Version	1.0
Model Curriculum Creation Date	25/11/2021
Model Curriculum Valid Up to Date	25/11/2024
Model Curriculum Version	1.0
Minimum Duration of the Course	390 Hours 00 Minutes
Maximum Duration of the Course	390 Hours 00 Minutes

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.

- Identify the various equipment and machinery used in the maintenance process.
- Conduct breakdown maintenance of the electrical and electronic systems of the equipment in the plant by following organizational policies and procedures.
- Maintain records, documents and reports related to the maintenance activities done on the equipment.
- Work effectively and efficiently as per schedules and timelines.
- Implement safety practices.
- Optimize the use of resources to ensure less wastage and maximum conservation.

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	**05:00**	**00:00**			**05:00**
Module 1: Introduction to the role of an Electric Vehicle Maintenance Technician	5:00	0:00			5:00
ASC/N9803 – Organize work and resources (Manufacturing) **NOS Version No. – 1.0** **NSQF Level – 3**	**15:00**	**30:00**			**45:00**
Module 2: Organize work and resources according to safety and conservation standards	15:00	30:00			45:00
ASC/N9802 – Interact effectively with colleagues, customers and others **NOS Version No. – 1.0** **NSQF Level – 3**	**15:00**	**25:00**			**40:00**
Module 3: Communicate effectively and efficiently	15:00	25:00			40:00
ASC/N9805 – Interpret engineering drawing **NOS Version No. – 1.0** **NSQF Level - 4**	**15:00**	**15:00**			**30:00**
Module 4: Interpret engineering drawing	15:00	15:00			30:00
ASC/N6816 – Perform maintenance of electric vehicle (EV) **NOS Version No. – 1.0**	**90:00**	**180:00**			**270:00**

NSQF Level - 4					
Module 5: Prepare for maintenance Electrical Vehicle (EV)	30:00	90:00			120:00
Module 6: Perform maintenance of Electrical Vehicle (EV)	60:00	120:00			180:00
Total Duration	**140:00**	**250:00**			**390:00**

Module Details

Module 1: Introduction to the role of an Electric Vehicle Maintenance Technician

Bridge module

Terminal Outcomes:

- Discuss the role and responsibilities of an Electric Vehicle Maintenance Technician.

Duration: *<05:00>*	**Duration**: *<00:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• List the role and responsibilities of an Electric Vehicle Maintenance Technician. • Discuss the job opportunities of an Electric Vehicle Maintenance Technician. • Explain about Indian EV manufacturing market. • List various automobile Original Equipment Manufacturers (OEMs) and different products/ models manufactured by them. • Discuss the maintenance standards and procedures followed in organisation. • Identify the standard checklists and schedules recommended by OEM.	
Classroom Aids:	
Whiteboard, marker pen, projector, standard checklists and schedules	
Tools, Equipment and Other Requirements	

Module 2: Organize work and resources according to safety and conservation standards

Mapped to ASC/N9803, v1.0

Terminal Outcomes:

- Employ appropriate ways to maintain safe and secure working environment.
- Perform work as per the quality standards.
- Apply conservation practices at the workplace.

Duration: *<15:00>*	**Duration**: *<30:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• List the potential workplace related risks and hazards, their causes and preventions. • Identify PPE to be used at workplace. • Identify various warning signs used at the workplace. • Describe appropriate strategies to deal with emergencies and accidents at the workplace. • Outline the organizational structure to be followed to report about health, safety and security breaches to the concerned authorities. • Discuss the importance of keeping work area clean and tidy. • Discuss the significance of conforming to basic hygiene practices such as washing hands, using alcohol based hand sanitizers or soap. • Discuss organizational hygiene and sanitation guidelines and ways of reporting breaches/gaps if any to the concerned authorities. • Discuss the ways of dealing with stress and anxiety. • Discuss how to complete the given work within the stipulated time period. • Explain how to maintain a proper balance between team and individual goals. • Explain 5S guidelines at workplace. • List the various materials used at the workplace. • Explain organisational recommended procedure for storage of tools, equipment and material after completion of work. • Explain the ways to optimize usage of resources. • Discuss various methods of waste management and its disposal.	• Apply appropriate safety practices to ensure safety of people at the workplace • Display the correct way of wearing and removing PPE such as face masks, hand gloves, face shields, PPE suits, etc. • Demonstrate the use of fire extinguisher. • Apply basic first aid procedure in case of emergencies. • Perform routine cleaning of tools, equipment and machines. • Employ various techniques for checking malfunctions in the equipment as per Standard Operating Procedure (SOP). • Show how to sanitize and disinfect one's work area regularly. • Demonstrate the correct way of washing hands using soap and water. • Demonstrate the correct way of sanitizing hands using alcohol-based hand rubs. • Demonstrate how to evacuate the workplace in case of an emergency. • Demonstrate sorting of materials, tools and equipment and spare parts after completion of work. • Demonstrate the steps involved in storage of tools, equipment and material after completion of work. • Perform basic checks to identify any spills and leaks and that need to be plugged /stopped. • Demonstrate different disposal techniques depending upon types of waste. • Employ different ways to check if equipment/machines are functioning as per requirements and report malfunctioning, if observed. • Employ ways for efficient utilization of material and water.

• List the different categories of waste for the purpose of segregation • Differentiate between recyclable and non-recyclable waste • State the importance of using appropriate colour dustbins for different types of waste. • Discuss common practices for conserving electricity at workplace. • Discuss the common sources of pollution and ways to minimize it.	
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/N9802, v1.0

Terminal Outcomes:

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

Duration: *<15:00>*	**Duration**: *<25:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain the organizational structure for communicating with colleagues, seniors and others. • 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. • State the procedure to receive work instructions and report problems to the supervisor. • List the various organizational policies and procedures to be followed at the workplace. • Describe different ways to rectify commonly occurring errors. • Explain the importance of complying with the instructions/guidelines and procedures while performing tasks related to the job specifications. • Discuss the importance of PwD and gender sensitization.	• Employ different means of communication depending upon the requirement while interacting with others. • Demonstrate using new ways to maintain good relationships with colleagues and supervisor. • Prepare a sample report to send the work status to the supervisor. • Demonstrate how to communicate with different genders and persons with disability (PwD) in a sensitive manner.
Classroom Aids:	
Whiteboard, marker pen, projector	
Tools, Equipment and Other Requirements	
Sample of escalation matrix, organisation structure.	

Module 4: Interpret engineering drawing

Mapped to ASC/N9805, v1.0

Terminal Outcomes:

- Describe the basics of engineering drawing.
- Interpret the machine drawings and symbols for understanding the job requirements.

Duration: *<15:00>*	**Duration:** *<15:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Identify uniqueness, dimensioning and important features of 2D and 3D shapes. • Identify types of lines, angles, points and their symmetry in shapes. • Differentiate between first angle and third angle projection. • Interpret 3 axis (x, y and z axis) of projection and machine symbols used in drawing. • Describe GD&T and use of its symbols in the drawings. • Identify required limits and tolerances of component from drawing. • Explain standards used in India for making assembly drawings. • Identify organisational drawing standards for interpreting the work requirements appropriately.	• Read an object in first angle and third angle projection. • Demonstrate appropriate way of reading and interpreting the shapes (cones, cylinder, sphere, cuboid, etc) on to a 2D and 3D projection. • Interpret and read orthographic and isometric views. • Read GD&T symbols in the given drawing. • Employ appropriate ways of storing the drawings in a defined and appropriate place. • Role play a situation on how to communicate the changes in drawing to the concerned authority.
Classroom Aids:	
Whiteboard, marker pen, projector	
Tools, Equipment and Other Requirements	
• Drawing tools • Engineering drawing handbook • Vehicle assembly drawings	

Module 5: Prepare for maintenance of Electric Vehicle (EV)

Mapped to ASC/N6816, v1.0

Terminal Outcomes:

- Identify tools and equipment required for maintenance of EV.
- Discuss the importance of coordinating with supervisor for identifying issues in EV and planning of maintenance activities.
- Read the maintenance schedule and checklist for planning of maintenance activities.

Duration: *<30:00>*	**Duration**: *<90:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• List various components /aggregates and the manufacturer's specifications of an electric vehicle. • Discuss basic technology used, functioning and interconnections of various systems and components of the vehicle. • Recall fundamental terms, laws and principles of electricity used in EV. • Describe various symbols, units and terms used in wiring diagrams associated with electrical/electric systems/components of the vehicle. • Explain legal regulations that need to be taken into account for handling electric vehicles. • Discuss the information derived from the job order, vehicle drawing, wiring diagrams and user manual of EV. • Recall the information mentioned in the maintenance checklist and schedule regarding the maintenance work. • List tools, equipment, accessories, consumables and spare parts required during the maintenance work. • Discuss the organisational process of collecting and storing consumables, spare parts, tools etc. from the store.	• Read the job order, equipment drawing, wiring diagrams and user manual for identifying the information about the EV. • Read the maintenance checklist for identifying the maintenance activities. • Perform the steps to prepare plan and schedule for maintenance activities on the basis of maintenance schedule and manufacturer's recommendations. • Role play a situation on how to coordinate with the superior for planning the maintenance activities as per maintenance schedule and checklist and confirming the same. • Demonstrate the standard operating procedure to use consumables, tools and equipment required during maintenance of EV.
Classroom Aids:	
Whiteboard, marker pen, projector	
Tools, Equipment and Other Requirements	
• PPTs of wiring diagrams and vehicle drawings • **Hand Tools:** Hammer ball peen, screw driver set, files, torque, wrenches, drills, taps. • **Testing equipment**: Vernier calliper, micrometer, feeler gauges, steel ruler, measuring tape, multimeter, voltmeter, ammeters ohm meter, battery testing equipment, neon light and oscilloscope • Wire stripper, crimping tool, soldering gun. • **Electronic components**: resistor, capacitor, diode, IC, cables, fasteners, connectors. • Electrical motors, controls, sensors, fuses	

Module 6: Perform maintenance of Electric Vehicle (EV)

Mapped to ASC/N6816, v1.0

Terminal Outcomes:

- Demonstrate inspection, testing, maintenance and repairing of EV.
- Demonstrate how to conduct trials of the vehicle for checking any abnormalities in the functioning.

Duration: *<60:00>*	**Duration**: *<90:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Discuss the necessary precautions to avoid any hazard and accident during maintenance activities. • List the commonly occurring faults/failures in EV and corrective actions taken to resolve them. • List the steps to be performed for dismantling the EV components for inspection, cleaning, repairing or replacing the consumables, spare parts and faulty components as per SOP. • Explain the process of checking the internal conditions of the vehicle with the specified quality standards. • Discuss breakdown maintenance process. • Explain methods of checking the vehicle to find out the root cause of the problems. • List various electronic meters and software tools used for identifying bugs in the vehicle system. • List consumables, tools and equipment required during service and repair of EV. • List different methods for disposing off waste material and scrap. • Explain the process of assembling back the EV components as per SOP. • Summarise the documents, records and information to be maintained related to the maintenance and repairing done. • Explain the process of evaluating the vehicle for no abnormalities.	• Employ appropriate ways of checking the standard parameters such as battery status, sensor calibration, actuators status, other electronic circuitry response etc. in the EV. • Demonstrate organizational specified procedure of dismantling the EV and repairing or replacing the consumables, spare parts and faulty components as per SOP. • Employ appropriate ways of checking the internal conditions of vehicle parts to test the working status and expected conditions. • Show how to conduct breakdown maintenance and check the vehicle to find out the root cause of the problems. • Demonstrate use of various electronic meters and software tools for identifying bugs in the vehicle system. • Apply appropriate ways to record the readings of parameters e.g. battery, other high voltage sections etc. as per SOP. • Role play a situation on how to discuss with seniors about the issues detected and identifying the corrective actions. • Perform the steps of cleaning, repairing or replacing the EV components. • Show how to dispose waste as per organisational guidelines. • Demonstrate organizational specified procedure of assembling back the EV components and preparing it for trials as per SOP. • Show how to fasten the components/subassemblies of vehicle together. • Employ appropriate ways for conducting trials of vehicle for checking any abnormalities in its functioning.

	• Show how to change the maintenance due/status sticker on the equipment. • Role play a situation on how to give suggestions to seniors for appropriate action based on findings in the breakdown maintenance. • Prepare records and documents related to repairs carried out, time taken and unplanned tasks encountered during maintenance activities. • Prepare a report for the superiors about the maintenance activity done.
Classroom Aids:	
Whiteboard, marker pen, projector	
Tools, Equipment and Other Requirements	
• PPTs of wiring diagrams and mechanical drawings • **Hand Tools:** Hammer ball peen, screw driver set, files, torque, wrenches, drills, taps. • **Measuring equipment**: Vernier calliper, micrometer, feeler gauges, steel ruler, measuring tape, multimeter. • **Electrical testing equipment**: volt meter, ammeters ohm meter, battery testing equipment, neon light and oscilloscope • Wire stripper, crimping tool, soldering gun. • **Electronic components**: resistor, capacitor, diode, IC, cables, fasteners, connectors. • Electrical motors, controls, sensors, fuses, Programable Logic Controller (PLC) • **PPE:** Gloves, safety shoes, goggles, ear plugs, safety helmet	

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
ITI	Fitter/Electrical/Mechanic Auto Electronical & Electronics/ Electronic Mechanic	5	Maintenance	1	Maintenance	NA
ITI	Fitter/Electrical/Mechanic Auto Electronical & Electronics/ Electronic Mechanic	6	Maintenance	0	Maintenance	NA
Certificate NSQF- Level 6	Automotive Maintenance Master Technician	3	Maintenance	1	Maintenance	NA
Diploma	Electrical/Electronics	3	Maintenance	1	Maintenance	NA
Diploma	Electrical/Electronics	4	Maintenance	0	Maintenance	NA

Trainer Certification	
Domain Certification	**Platform Certification**
"Electric Vehicle Maintenance Technician, ASC/Q6809, 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/Assessment Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
ITI	Fitter/Electrical/Mechanic Auto Electronical & Electronics/ Electronic Mechanic	6	Maintenance	1	Maintenance	NA
ITI	Fitter/Electrical/Mechanic Auto Electronical & Electronics/ Electronic Mechanic	7	Maintenance	0	Maintenance	NA
Certificate NSQF- Level 6	Automotive Maintenance Master Technician	4	Maintenance	1	Maintenance	NA
Diploma	Electrical/Electronics	4	Maintenance	1	Maintenance	NA
Diploma	Electrical/Electronics	5	Maintenance	0	Maintenance	NA

Assessor Certification	
Domain Certification	**Platform Certification**
"Electric Vehicle Maintenance Technician, ASC/Q6809, 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