Model Curriculum

QP Name: Automotive AC Technician

QP Code: ASC/Q1416

QP Version: 2.0

NSQF Level: 4

Model Curriculum Version: 1.0

Automotive Skill Development Council
Leela Building, 153 GF, Okhla Phase III, Okhla Industrial Area, New Delhi, Delhi 110020

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Training Parameters

Sector	Automotive
Sub-Sector	Automotive Vehicle Service
Occupation	Technical Service & Repair
Country	India
NSQF Level	4
Aligned to NCO/ISCO/ISIC Code	NCO-2015/7231.0102
Minimum Educational Qualification & Experience	8th Class + 1 year ITI with 2 years of experience in Automotive Sector OR 8th Class + 2 year ITI with 1 year of experience in Automotive Sector OR 10th Class with 1 Year of experience OR Certificate-NSQF (Four Wheeler Service Assistant Level 3) with 2 Years of experience in Automotive Service
Pre-Requisite License or Training	LMV Driving License
Minimum Job Entry Age	18 Years
Last Reviewed On	29/07/2021
Next Review Date	29/07/2026
NSQC Approval Date	29/07/2021
Version	2.0
Model Curriculum Creation Date	29/07/2021
Model Curriculum Valid Up to Date	29/07/2026
Model Curriculum Version	1.0
Minimum Duration of the Course	456 Hours, 0 Minutes
Maximum Duration of the Course	456 Hours, 0 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.

- Work effectively and efficiently as per schedules and timelines.
- Implement safety practices.
- Optimize the use of resources.
- Communicate effectively using interpersonal skills.
- Identify the role, responsibilities and scope of work of an automotive AC technician.
- Perform installation of the air conditioning (AC) system in the vehicles.
- Carry out service and routine maintenance of the AC system of vehicles.

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	**08:00**	**00:00**			**08:00**
Module 1: Introduction to the role of Automotive Body Repair Assistant	08:00	0:00	-	-	08:00
ASC/N9801: Organize Work and Resources (Service) **NOS Version No. 1.0** **NSQF Level 4**	**16:00**	**24:00**	-	-	**40:00**
Module 2: Work effectively and efficiently	08:00	16:00	-	-	24:00
Module 3: Optimize resource utilization	08:00	08:00	-	-	16:00
ASC/N9802: Interact Effectively with Colleagues, Customers and Others **NOS Version No. 1.0** **NSQF Level 4**	**16:00**	**24:00**	-	-	**40:00**
Module 4: Communicate effectively and efficiently	16:00	24:00	-	-	40:00
ASC/N1425: Install an automobile AC system	**56:00**	**112:00**	-	-	**168:00**

NOS Version No. 2.0 **NSQF Level 4**					
Module 5 : Install an AC system in a vehicle	56:00	112:00	-	-	168:00
ASC/N1426: Perform service and routine maintenance of the AC system **NOS Version No. 2.0** **NSQF Level 4**	**72:00**	**128:00**	-	-	**200:00**
Module 6 : Perform maintenance of a vehicle's AC system	72:00	128:00	-	-	200:00
Total Duration	**168:00**	**288:00**	-	-	**456:00**

Module Details

Module 1- Introduction to the Role of an Automotive AC Technician

Bridge Module

Terminal Outcomes:

- Identify the role, responsibilities and scope of work of an automotive AC technician.
- Identify the importance of following process, policies, and procedures.

Duration: *08:00*	**Duration**: *0:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Describe the role and responsibilities of an automotive AC technician. • List the schedules and checklists pertaining to AC installations and repairs. • Explain about Automotive Industry in India, workshop structure and role and responsibilities of different people in the workshop. • Elaborate standard operating procedures (SOPs) regarding receiving vehicles, opening job card, allocation of work, invoicing, vehicle delivery, handling complaints etc. • Describe how to work as per organisational and professional code of ethics and standards of practice. • Outline the safety, health and environment policies to be followed for the automotive sector. • Discuss SOPs recommended by OEM w.r.t. AC installation and maintenance in the vehicle.	
Classroom Aids:	
Laptop, white board, marker, projector	
Tools, Equipment and Other Requirements	
PPE kit, job card, protective covers of vehicle, hand tools, AC systems, equipment, AC system's spare parts, etc.	

Module 2 - Work Effectively and Efficiently

Mapped to NOS ASC/N9801 v1.0

Terminal Outcomes:

- Employ appropriate ways to maintain a safe and secure working environment.
- Perform work as per the quality standards.

Duration: *<08:00>*	**Duration:** *<16:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Outline the organizational structure to be followed to report about health, safety and security breaches to the concerned authorities. • List the potential workplace related risks and hazards, their causes and preventions. • State the methods to keep the work area clean and tidy. • Discuss how to complete the given work within the stipulated time period. • Explain how to maintain a proper balance between team and individual goals. • Discuss epidemics and pandemics and their impact on society at large. • Discuss the significance of conforming to basic hygiene practices such as washing hands, using alcohol-based hand sanitizers. • Discuss the use of proper PPE for maintaining health and hygiene at workplace and the process of wearing/discarding them. • Define self-quarantine or self-isolation. • Discuss the importance of identifying and reporting symptoms to the concerned authorities. • Explain the significance of following prescribed rules and guidelines during an epidemic or a pandemic. • Discuss organizational hygiene and sanitation guidelines and ways of reporting breaches/gaps if any. • Discuss the ways of dealing with stress and anxiety during an epidemic or a pandemic.	• Perform routine cleaning of tools, equipment and machines. • Employ various techniques for checking malfunctions in the equipment as per Standard Operating Procedure (SOP). • Apply basic housekeeping practices to ensure that the work area is clean, such as mopping spills and leaks, cleaning grease stains etc. • Demonstrate how to evacuate the workplace in case of an emergency. • 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. • Display the correct way of wearing and removing PPE such as face masks, hand gloves, face shields, PPE suits, etc. • Demonstrate appropriate social and behavioural etiquette (greeting and meeting people, spitting/coughing/sneezing, etc.). • Prepare a list of relevant hotline/emergency numbers.
Classroom Aids:	
White board/black board marker/chalk, duster, computer or Laptop attached to LCD projector	
Tools, Equipment and Other Requirements	

Personal Protection Equipment: safety glasses, head protection, rubber gloves, safety footwear, warning signs and tapes, fire extinguisher and first aid kit Sanitization kit, disinfectants, alcohol-based sanitizers, different types of face masks, shields, suits, etc.

Module 3 - Optimize Resource Utilization

Mapped to NOS ASC/N9801 v1.0

Terminal Outcomes:

- Use the resources efficiently.
- Apply conservation practices at the workplace.

Duration: *<08:00>*	**Duration:** *<08:00>*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Explain the ways to optimize usage of resources. • Discuss various methods of waste management and its disposal. • 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 the common sources of pollution and ways to minimize it.	• Perform basic checks to identify any spills and leaks and that need to be plugged /stopped. • Demonstrate different disposal techniques depending upon different 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 • Use energy efficient electrical appliances and devices to ensure energy conservation
Classroom Aids:	
White board/black board marker/chalk, duster, computer or Laptop attached to LCD projector	
Tools, Equipment and Other Requirements	
Different type of waste bins to collect and segregate waste for disposal	

Module 4 - Communicate Effectively and Efficiently

Mapped to NOS ASC/N9802 v1.0

Terminal Outcomes:

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

Duration: *<16:00>*	**Duration:** *<24:00>*
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 and customers. • 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:	
White board/black board marker/chalk, duster, computer or Laptop attached to LCD projector	
Tools, Equipment and Other Requirements	
Sample of escalation matrix, organisation structure.	

Module 5 - Install an AC System in a Vehicle

Mapped to NOS ASC/N1425, v2.0

Terminal Outcomes:

- Perform the steps to install an AC system in a vehicle.

Duration: *56:00*	**Duration**: *112:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Identify the various electrical components, electric and electronic signals, circuits and their importance as well as proper functioning in an AC system of a vehicle. • Elaborate the fundamentals terms as well as laws and principles of electricity and refrigeration. • Discuss the job card received from the supervisor to understand requirements for installation of AC system as per vehicle and manufacturer specifications. • Describe the symbols, units and terms used in wiring diagrams associated with AC system of a vehicle. • Summarise the interconnection of systems with each other and their impact on one another. • Recall the SOPs related to usage of tools and equipment in diagnosis and repair of AC system. • Identify the various sources of information available for assessing requirements as per the vehicle/equipment manufacturer specifications • Explain how to report any malfunctions observed in the tools/equipment/material to the concerned person. • Describe the possible damages that can be caused to vehicles during AC installation and precautions to be taken to avoid these. • Identify the specified quantity of refrigerant and PAG oil as per the SOP for filling the AC unit. • Explain the importance of following SOP to check the AC system post installation for performance and ensure all tasks have been completed. • Describe the importance for maintaining complete documentation on the job/task of AC system installation in the vehicle. • Discuss the legal regulations to be considered for handling refrigerant and	• Demonstrate how to collect and check/use the tools, equipment, components/aggregates, fittings or materials as required for AC system installation. • Employ appropriate techniques to remove dummy plug or covers taking necessary precautions and maintaining cleanliness in the surrounding areas before installing the AC. • Perform necessary steps to make holes/cuts on various surfaces such as metal sheet, plastic, fabric etc., for fitting the AC system as per SOPs. • Demonstrate how to install and fit the AC system in the engine and passenger compartment as specified by the OEM depending on the vehicle model/make. • Perform steps to connect and test the refrigerant and wiring circuit connections. • Implement techniques to check all AC system components for proper installation, fitment and functioning. • Employ proper procedure for returning leftover consumable/parts and tools/equipment to the store/person incharge. • Implement proper waste disposal techniques for disposing packing wraps/box/covers and other material used during installation of the AC system. • Demonstrate how to check and identify faults in a retrofit AC system as per SOP and report the fault to the supervisor/service advisor for further action.

hazardous waste. • Explain how to use computers for checking and performance testing of a newly installed AC system.	
Classroom Aids:	
Laptop, white board, marker, projector	
Tools, Equipment and Other Requirements	
PPE kit, job card, protective covers of vehicle, hand tools, power tools, special service tools, AC system test equipment, workshop equipment, AC systems retro fitment kit, consumables, etc.	

Module 6 - Perform Maintenance of a Vehicle's AC System

Mapped to NOS ASC/N1426, v2.0

Terminal Outcomes:

- Perform the pre-requisite activities for service and repair of the AC system and components.
- Perform service and repair of Air conditioning System and components.

Duration: *72:00*	**Duration**: *128:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
• Discuss the job card received from the supervisor to understand requirements/aggregate specifications (vehicle and AC system manufacturer specifications) for repair or maintenance. • Explain how to determine whether the AC system needs servicing/detailed diagnosis for poor performance. • Discuss how to find faults in the AC system of a vehicle using visual and functional assessment such as damage, corrosion, wear, refrigeration leakage etc. • Describe the possible damages that can be caused to vehicles during AC repair/service and precautions to be taken to avoid these. • Describe how to identify and report the malfunctions/repairs in the vehicle beyond own scope to the concerned person. • Explain the importance of following SOP to check the AC system post service and repair. • Discuss the importance of maintaining proper documentation related to inspection, servicing and repair activities. • Elaborate how to ensure whether a service or repair task has been completed, as per specifications, before releasing the vehicle for the next procedure. • Explain the process of thoroughly cleaning, testing, inspecting and evaluating the AC system and its components for their functioning and performance.	• Employ various techniques for testing and checking the functioning of the AC system. • Demonstrate how to test drive the vehicle to check the AC system's performance, diagnose issues, and park the vehicle on appropriate platform depending on the nature of job to be performed. • Implement ways to visually inspect the AC system and identify faults, such as external damage or leakage, wear and tear etc. • Demonstrate how to collect, check and use the tools, equipment, components/aggregates, fittings or materials as required for AC system service/repair as per SOP, and report any malfunctions to concerned authority. • Perform steps to diagnose indirect faults in the AC system of the vehicle. • Demonstrate how to recover, refill, flush and evacuate air and moisture from the AC system refrigerant circuit, considering all OEM SOPs and specifications. • Employ proper techniques to remove components of the AC system and test refrigerant circuit, wiring circuit and AC system component. • Implement correct ways to plug openings of refrigerant circuit joints and then place removed components securely as specified by OEM. • Demonstrate how to clean and condition dismantled components as per OEM guidelines before placing them back into the AC system of the vehicle. • Perform necessary steps and procedures to validate the performance of the AC system post repair and report to supervisor/service advisor if further inspection is required. • Implement proper waste disposal techniques for disposing packing

	wraps/box/covers and other material used during service/repair of the AC system. • Employ proper procedure for returning leftover consumable/parts and tools/equipment to the store/person incharge after service/repair of the AC system has been completed and verified. • Demonstrate how to perform scheduled checks, calibration and timely repairs for workshop tools, equipment and workstations.
Classroom Aids:	
Laptop, white board, marker, projector	
Tools, Equipment and Other Requirements	
PPE kit, job card, protective covers of vehicle, hand tools, power tools, special service tools, AC system test equipment, workshop equipment, AC systems retro fitment kit, consumables, etc.	

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
ITI (Mechanic Motor Vehicle)	Automotive Repair	3	Four Wheeler Service	1	Four Wheeler Service	**NA**
ITI (Mechanic Motor Vehicle)	Automotive Repair	4	Four Wheeler Service	NA	NA	**NA**
Diploma (Automobile Engineering/ Mechanical Engineering)	Automotive Repair	2	Four Wheeler Service	1	Four Wheeler Service	**NA**
Diploma (Automobile Engineering/ Mechanical Engineering)	Automotive Repair	3	Four Wheeler Service	NA	NA	**NA**
Certificate-NSQF(Two/Four Wheeler Master Technician)	Automotive Repair	2	Four Wheeler Service	1	Four Wheeler Service	**NA**

Trainer Certification	
Domain Certification	**Platform Certification**
"Automotive AC Technician", QP: "ASC/Q1416", minimum accepted score is 80%	"Trainer", "MEP/Q2601" with scoring of minimum 80%

Assessor Requirements

Assessor Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	***Specialization***	***Years***	***Specialization***	
ITI (Mechanic Motor Vehicle)	Automotive Repair	4	Four Wheeler Service	1	Four Wheeler Service	**NA**
ITI (Mechanic Motor Vehicle)	Automotive Repair	5	Four Wheeler Service	NA	NA	**NA**
Diploma (Automobile Engineering/ Mechanical Engineering)	Automotive Repair	3	Four Wheeler Service	1	Four Wheeler Service	**NA**
Diploma (Automobile Engineering/ Mechanical Engineering)	Automotive Repair	4	Four Wheeler Service	NA	NA	**NA**
Certificate-NSQF(Two/Four Wheeler Master Technician) Level-6	Automotive Repair	3	Four Wheeler Service	1	Four Wheeler Service	**NA**

Assessor Certification	
Domain Certification	**Platform Certification**
"Automotive AC Technician", QP: "ASC/Q1416", minimum accepted score is 80%	"Assessor", "MEP/Q2701" with scoring of minimum 80%

Assessment Strategy

1. Assessment System Overview:

    - Batches assigned to the assessment agencies for conducting the assessment on 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 – The assessor should:

    - 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 are created by the Subject Matter Experts (SME)
    - Question papers created by the SME are 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
PwD	Persons with Disability
OEM	Original Equipment Manufacturer