



# Model Curriculum

**Qualification Name: Automobile Technician (Diagnostics)**

**QP Version: 1.0**

**NSQF Level: 4**

**Model Curriculum Version: 1.0**

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## Training Parameters

<b>Sector</b>	Automotive
<b>Sub-Sector</b>	Vehicle Service and Repair
<b>Occupation</b>	Automobile Service
<b>Country</b>	India
<b>NSQF Level</b>	4
<b>Aligned to NCO/ISCO/ISIC Code</b>	NCO-2015/7213.02
<b>Minimum Educational Qualification and Experience</b>	NSQF Certificate in Automobile Jr. Technician (Service and Maintenance) level 3.5 <b>OR</b> 12th Pass <b>OR</b> 10th+2 Years of NTC/NAC <b>OR</b> 10 <sup>th</sup> class + 3 years of relevant experience
<b>Pre-Requisite License or Training</b>	NA
<b>Minimum Job Entry Age</b>	16 years
<b>Last Reviewed On</b>	15/03/2024
<b>Next Review Date</b>	15/03/2027
<b>NSQC Approval Date</b>	15/03/2024
<b>QP Version</b>	1.0
<b>Model Curriculum Creation Date</b>	15/03/2024
<b>Model Curriculum Valid Up to Date</b>	15/03/2027
<b>Model Curriculum Version</b>	1.0
<b>Minimum Duration of the Course</b>	1200 Hours
<b>Maximum Duration of the Course</b>	1200 Hours

## Program Overview

This section summarizes the end objectives of the program along with its duration.

## Training Outcomes

A Diploma in Automobile Diagnostic Technician is a specialized educational program that focuses on providing students with practical skills and theoretical knowledge related to various aspects of

### **Vehicle Diagnostics.**

At the end of the program, the learner should have acquired the listed knowledge and skills.

#### **Advanced Diagnostic Skills:**

Demonstrate advanced skills in diagnosing complex automotive issues using diagnostic tools and equipment.

#### **Systematic Problem Solving:**

Apply systematic problem-solving techniques to identify and troubleshoot complex electrical, mechanical, and electronic issues in vehicles.

#### **Electronic Control Systems:**

Understand and diagnose electronic control systems, including engine control modules (ECM), transmission control modules (TCM), and body control modules (BCM).

#### **Advanced Engine Diagnostics:**

Conduct in-depth diagnostics of internal combustion engines, including issues related to fuel injection, ignition systems, and emissions control.

#### **Transmission Diagnostics:**

Diagnose and repair complex transmission issues, including automatic and manual transmissions.

#### **Vehicle Network Diagnostics:**

Understand and diagnose issues related to in-vehicle networks, communication protocols, and data bus systems.

#### **Advanced Sensor and Actuator Diagnostics:**

Analyze and troubleshoot sensor and actuator issues, including those related to ABS (anti-lock braking system), traction control, and stability control.

#### **Hybrid and Electric Vehicle Diagnostics:**

Acquire skills in diagnosing and servicing hybrid and electric vehicles, including high-voltage systems, batteries, and electric drivetrains.

## Mandatory & Elective Modules

The table lists the modules and their duration corresponding to the Mandatory & Elective Subjects of the Curriculum.

Subject Details	NOS code	Subject Type	Theory	Practical	On-the-Job Training Duration	Total Duration
			Duration	Duration		
Automobile Safety System	ASC/N1493	Core Mandatory	15	30	0	45
Automobile Service and Repair (Mechanical)	ASC/N1494	Core Mandatory	15	30	0	45
Automobile Air Conditioning	ASC/N1495	Core Mandatory	15	30	0	45
Automobile Body Repair	ASC/N1499	Core Elective-1	30	60	0	90
Automobile Paint Refinish	ASC/N1301	Core Elective-2				
Applied Physics	ASC/N9837	Non-Core	60	90	0	150
Automobile System wise Performance Testing (Mechanical)	ASC/N1496	Core Mandatory	15	30	0	45
Quality Management	ASC/N6315	Core Mandatory	15	30	0	45
Automobile System wise Performance Testing (Electrical & Electronics)	ASC/N1497	Core Mandatory	15	30	0	45
Spare Parts Inventory Management	ASC/N1302	Core Elective-1	30	60	0	90
Warranty Management	ASC/N1303	Core Elective-2				
Language (English) Skills	ASC/N9839	Non-Core	60	90	0	150
Employability Skills (120 Hours)	DGT/VSQ/0104	Non-Core	48	72	0	120
Workshop Technology (Four-Wheeler)	ASC/N1498	Core Mandatory	0	0	330	330
<b>Total Duration</b>			<b>318</b>	<b>552</b>	<b>330</b>	<b>1200</b>

## Subject Details

### Semester-1

#### Subject: 1 Automobile Safety System

*Mapped to ASC/N1493*

#### Terminal Outcomes:

Understanding Safety Regulations:

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- Participants should have a clear understanding of relevant safety regulations and standards governing automobiles.

**Knowledge of Automotive Safety Systems:**

- Participants should be able to demonstrate in-depth knowledge of various safety systems in automobiles, including passive and active safety features.

**Identification of Safety Components:**

- Participants should be capable of identifying and explaining the functions of key safety components, such as airbags, seat belts, ABS (Anti-lock Braking System), ESC (Electronic Stability Control), and more.

**Systematic Problem Identification:**

- Participants should develop skills in systematically identifying safety-related issues and malfunctions in vehicles.

**Safe Vehicle Operation:**

- Participants should understand and apply safe driving practices, considering the role of safety systems in enhancing vehicle stability and occupant protection.

<b>Duration: &lt;15:00&gt;</b>	<b>Duration: &lt;30:00&gt;</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<p><b>Introduction to Vehicle Safety:</b></p> <ul style="list-style-type: none"> <li>• Understand the importance of vehicle safety in the automotive industry.</li> <li>• Recognize the historical evolution of safety features in automobiles.</li> </ul> <p><b>Vehicle Crash Dynamics:</b></p> <ul style="list-style-type: none"> <li>• Comprehend the physics and dynamics of vehicle crashes.</li> <li>• Explore the factors affecting crash severity and occupant safety.</li> </ul> <p><b>Occupant Restraint Systems:</b></p> <ul style="list-style-type: none"> <li>• Study the design and operation of seat belts and airbags.</li> <li>• Understand the role of seat belts and airbags in minimizing injury during collisions.</li> </ul> <p><b>Crash Sensors and Impact Detection:</b></p> <ul style="list-style-type: none"> <li>• Explore the sensors and systems used for crash detection.</li> <li>• Understand how these systems contribute to the activation of safety features.</li> </ul> <p><b>Anti-lock Braking System (ABS):</b></p> <ul style="list-style-type: none"> <li>• Learn the principles of ABS operation.</li> <li>• Understand how ABS enhances vehicle stability during braking.</li> </ul>	<p><b>Understanding Safety System Components:</b></p> <ul style="list-style-type: none"> <li>• Identify and explain the components of various safety systems, including airbag systems, anti-lock braking systems (ABS), electronic stability control (ESC), and traction control systems.</li> </ul> <p><b>Safe Work Practices:</b></p> <ul style="list-style-type: none"> <li>• Demonstrate safe work practices when handling and working around safety system components, including the proper use of personal protective equipment (PPE).</li> </ul> <p><b>Diagnostic Procedures:</b></p> <ul style="list-style-type: none"> <li>• Perform diagnostic procedures to identify faults and malfunctions in safety systems using diagnostic tools and equipment.</li> </ul> <p><b>Troubleshooting and Problem-Solving:</b></p> <ul style="list-style-type: none"> <li>• Apply systematic troubleshooting techniques to identify and resolve issues within safety systems, considering both electrical and mechanical aspects.</li> </ul> <p><b>Maintenance and Inspection:</b></p> <ul style="list-style-type: none"> <li>• Conduct routine maintenance and inspections of safety system components, including checking sensor connections, inspecting wiring, and evaluating system performance.</li> </ul>

<p><b>Electronic Stability Control (ESC):</b></p> <ul style="list-style-type: none"> <li>● Comprehend the function and benefits of ESC systems.</li> <li>● Explore how ESC systems improve vehicle stability and control.</li> </ul> <p><b>Traction Control System (TCS):</b></p> <ul style="list-style-type: none"> <li>● Understand the principles of TCS.</li> <li>● Learn how TCS prevents wheel spin and enhances traction.</li> </ul> <p><b>Electronic Brake-force Distribution (EBD):</b></p> <ul style="list-style-type: none"> <li>● Explore the concept of EBD in brake systems.</li> <li>● Understand how EBD optimizes brake force distribution for improved safety.</li> </ul>	<p><b>Airbag System Handling:</b></p> <ul style="list-style-type: none"> <li>● Safely handle airbag components, including deploying and disposing of airbags according to safety protocols.</li> </ul> <p><b>Anti-lock Braking System (ABS) Operations:</b></p> <ul style="list-style-type: none"> <li>● Understand the principles of ABS operation and demonstrate proficiency in diagnosing and repairing ABS-related issues.</li> </ul> <p><b>Electronic Stability Control (ESC) and Traction Control:</b></p> <ul style="list-style-type: none"> <li>● Interpret the functions of ESC and traction control systems and demonstrate the ability to diagnose and rectify faults in these systems.</li> </ul>
<p><b>Classroom Aids:</b></p> <p>Whiteboard, marker pen, projector</p>	
<p><b>Tools, Equipment and Other Requirements</b></p> <p><b>Airbag Deployment Simulator:</b></p> <ul style="list-style-type: none"> <li>● An airbag deployment simulator for demonstrating how airbags work and the safety measures associated with their deployment.</li> </ul> <p><b>Anti-lock Braking System (ABS) Simulator:</b></p> <ul style="list-style-type: none"> <li>● ABS simulator equipment to demonstrate the functionality of the ABS system and how it prevents wheel lockup during braking.</li> </ul> <p><b>Electronic Stability Control (ESC) Simulator:</b></p> <ul style="list-style-type: none"> <li>● ESC simulator for illustrating how electronic stability control systems help maintain vehicle stability during dynamic driving conditions.</li> </ul> <p><b>Collision Avoidance System Simulator:</b></p> <ul style="list-style-type: none"> <li>● Simulation tools for demonstrating collision avoidance systems, including radar and camera-based technologies.</li> <li>● Lane Departure Warning System Simulator:</li> </ul> <p>Simulators or demonstration models illustrating how lane departure warning systems work to alert drivers when unintentional lane departure occurs.</p> <p><b>Blind Spot Detection System Simulator:</b></p> <ul style="list-style-type: none"> <li>● Simulators for blind-spot detection systems, showcasing how these systems monitor adjacent lanes for potential hazards.</li> </ul> <p><b>Forward Collision Warning System Simulator:</b></p>	

Simulation tools demonstrating how forward collision warning systems alert drivers to potential front-end collisions.

## Subject: 2 Automobile Service and Repair (Mechanical)

### Mapped to ASC/N1494

#### Terminal Outcomes:

Basic Automotive Knowledge:

- Participants should demonstrate a comprehensive understanding of basic automotive systems, components, and their functions.

Vehicle Inspection and Diagnostics:

- Ability to conduct thorough vehicle inspections to identify mechanical issues and use diagnostic tools for problem identification.

Engine Service and Repair:

- Proficiency in performing routine engine maintenance tasks, such as oil changes, filter replacements, and spark plug replacements.
- Skills in diagnosing and repairing common engine-related issues.

Transmission and Drivetrain Maintenance:

- Ability to service and maintain transmissions, including fluid changes and adjustments.
- Basic skills in diagnosing and addressing drivetrain issues.

Brake System Service:

- Proficiency in brake system inspection, including brake pad and rotor replacement.
- Skills in diagnosing and repairing common brake system problems.

<b>Duration: &lt;15:00&gt;</b>	<b>Duration: &lt;30:00&gt;</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<p>Understanding Automotive Systems:</p> <ul style="list-style-type: none"> <li>• Demonstrate a comprehensive understanding of the major automotive systems, including the engine, transmission, suspension, steering, braking, and electrical systems.</li> </ul> <p>Engine Operation and Components:</p> <ul style="list-style-type: none"> <li>• Explain the basic principles of internal combustion engines, including the four-stroke cycle, engine components, and their functions.</li> </ul> <p>Transmission Systems:</p>	<p>Vehicle Inspection and Diagnosis:</p> <ul style="list-style-type: none"> <li>• Conduct thorough visual inspections of vehicles to identify potential issues.</li> <li>• Utilize diagnostic tools to pinpoint mechanical problems and determine necessary repairs.</li> </ul> <p>Engine Maintenance and Repair:</p> <ul style="list-style-type: none"> <li>• Perform routine engine maintenance tasks, such as oil changes, filter replacements, and spark plug changes.</li> <li>• Diagnose and repair engine-related issues, including fuel system problems and ignition system malfunctions.</li> </ul>



<ul style="list-style-type: none"> <li>● Describe the operation and types of automotive transmissions, including manual and automatic transmissions.</li> </ul> <p>Chassis and Suspension Systems:</p> <ul style="list-style-type: none"> <li>● Understand the principles of chassis design and suspension systems, including the types of suspension components and their functions.</li> <li>● Steering Systems: Explain the operation and components of different steering systems, including rack-and-pinion, recirculating ball, and power steering.</li> <li>● Braking Systems: Describe the principles of operation of braking systems, including disc brakes, drum brakes, and anti-lock braking systems (ABS).</li> </ul>	<p>Brake System Service:</p> <ul style="list-style-type: none"> <li>● Inspect and service brake systems, including brake pad and rotor replacement.</li> <li>● Diagnose brake issues and address problems related to the brake hydraulic system.</li> </ul> <p>Suspension and Steering System Repair:</p> <ul style="list-style-type: none"> <li>● Conduct inspections of suspension and steering components.</li> <li>● Replace worn-out or damaged suspension and steering parts.</li> </ul> <p>Transmission and Drivetrain Service:</p> <ul style="list-style-type: none"> <li>● Perform transmission fluid changes and drivetrain inspections.</li> <li>● Diagnose and address common transmission issues.</li> </ul>
<p><b>Classroom Aids:</b></p>	
<p>Whiteboard, marker pen, projector</p>	
<p><b>Tools, Equipment and Other Requirements</b></p>	
<p>Basic Hand Tools:</p> <ul style="list-style-type: none"> <li>● Wrench set (combination wrenches, socket wrenches)</li> <li>● Screwdrivers (flathead and Phillips)</li> <li>● Pliers (regular, needle-nose, locking pliers)</li> <li>● Hammers (ball-peen, rubber mallet)</li> <li>● Allen wrenches (hex keys)</li> </ul> <p>Diagnostic Tools:</p> <ul style="list-style-type: none"> <li>● OBD-II scan tool for reading and interpreting vehicle diagnostic trouble codes (DTCs).</li> <li>● Multimeter for measuring voltage, current, and resistance.</li> </ul> <p>Engine Tools:</p> <ul style="list-style-type: none"> <li>● Compression tester for checking engine compression.</li> <li>● Engine hoist for lifting and removing engines.</li> </ul> <p>Transmission and Drivetrain Tools:</p> <ul style="list-style-type: none"> <li>● Transmission jack for removing and installing transmissions.</li> <li>● Differential gear puller for servicing drivetrain components.</li> </ul> <p>Brake Service Tools:</p> <ul style="list-style-type: none"> <li>● Brake caliper tool for servicing brake components.</li> <li>● Brake fluid bleeder kit for bleeding brake systems.</li> </ul> <p>Suspension System Tools:</p> <ul style="list-style-type: none"> <li>● Shock absorber preload adjuster for adjusting suspension components.</li> <li>● Ball joint separator for servicing suspension parts.</li> </ul>	

## Subject: 3 Automobile Air Conditioning

### Mapped to ASC/N1495

#### Terminal Outcomes:

##### Understanding Air Conditioning Principles:

- Demonstrate a comprehensive understanding of the principles of refrigeration and air conditioning in the context of automotive systems.

##### System Components Identification:

- Identify and explain the various components of an automotive air conditioning system, including the compressor, condenser, evaporator, expansion valve, and refrigerant.

##### Refrigerant Types and Characteristics:

- Understand different types of refrigerants used in automotive air conditioning systems, including their characteristics, environmental considerations, and regulations.

##### System Design and Operation:

- Explain the design and operational principles of automotive air conditioning systems, including the heat transfer process and the role of each component.

##### Refrigerant Handling and Safety:

- Demonstrate safe practices in handling and managing refrigerants, including proper evacuation and recovery procedures, in compliance with safety and environmental regulations.

<b>Duration: &lt;15:00&gt;</b>	<b>Duration: &lt;30:00&gt;</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<p>Understanding Basic Thermodynamics:</p> <ul style="list-style-type: none"> <li>● Explain the fundamental principles of thermodynamics, specifically as they apply to the refrigeration cycle in automotive air conditioning.</li> </ul> <p>Overview of Automotive Air Conditioning Systems:</p> <ul style="list-style-type: none"> <li>● Provide an overview of the components and functions of automotive air conditioning systems, including the compressor, condenser, evaporator, and expansion valve.</li> <li>● Properties and Characteristics of Refrigerants:</li> </ul>	<p>Understanding A/C Components:</p> <ul style="list-style-type: none"> <li>● Identify and understand the various components of an automotive air conditioning system, including the compressor, condenser, evaporator, expansion valve, and refrigerant lines.</li> </ul> <p>Refrigerant Handling and Safety:</p> <ul style="list-style-type: none"> <li>● Demonstrate safe handling practices for refrigerants, including proper storage, recovery, and disposal. Understand the safety implications of working with pressurized systems.</li> </ul>

<ul style="list-style-type: none"> <li>● Describe the properties and characteristics of refrigerants used in automotive air conditioning, including their environmental impact and regulatory considerations.</li> </ul> <p>Refrigeration Cycle:</p> <ul style="list-style-type: none"> <li>● Understand and explain the stages of the refrigeration cycle, including compression, condensation, expansion, and evaporation.</li> </ul> <p>System Pressures and Temperatures:</p> <ul style="list-style-type: none"> <li>● Analyze the relationship between pressure and temperature in different components of the air conditioning system.</li> </ul> <p>Compressor Operation:</p> <ul style="list-style-type: none"> <li>● Explain the role of the compressor in the air conditioning system and understand its various types and working principles.</li> </ul> <p>Condenser and Evaporator Functionality:</p> <ul style="list-style-type: none"> <li>● Describe the functions of the condenser and evaporator coils in heat exchange processes.</li> </ul>	<p>System Diagnosis:</p> <ul style="list-style-type: none"> <li>● Use diagnostic tools to identify common issues in air conditioning systems, such as leaks, compressor failures, and electrical malfunctions.</li> </ul> <p>Pressure Testing:</p> <ul style="list-style-type: none"> <li>● Perform pressure testing of A/C systems to identify leaks and ensure proper system operation.</li> </ul> <p>Refrigerant Recovery and Charging:</p> <ul style="list-style-type: none"> <li>● Demonstrate the proper procedures for recovering and charging refrigerants, ensuring that the system is filled to the correct specifications.</li> </ul> <p>Compressor Servicing:</p> <ul style="list-style-type: none"> <li>● Learn to diagnose and service air conditioning compressors, including replacement and proper lubrication.</li> </ul> <p>Evaporator and Condenser Maintenance:</p> <ul style="list-style-type: none"> <li>● Understand how to clean, maintain, and replace evaporators and condensers to ensure optimal heat exchange.</li> </ul>
<b>Classroom Aids:</b>	
Whiteboard, marker pen, projector	
<b>Tools, Equipment and Other Requirements</b>	
<p>Refrigerant Recovery Machine:</p> <p>Used for recovering, recycling, and recharging refrigerant from automotive air conditioning systems.</p> <p>A/C Manifold Gauge Set:</p> <p>Essential for measuring pressure and checking the status of the refrigerant in the A/C system.</p> <p>Vacuum Pump:</p> <p>Used for evacuating air and moisture from the A/C system before refrigerant charging.</p> <p>Electronic Leak Detector:</p> <p>Detects leaks in the A/C system by sensing refrigerant leaks.</p> <p>A/C Compressor Clutch Holding Tool:</p>	

Holds the A/C compressor clutch stationary during service work.  
A/C System Flush Kit:

Used for flushing contaminants and debris from the A/C system.  
Thermometer or Infrared Thermometer:

Measures temperatures in different components of the A/C system for diagnostics.  
A/C System Oil Injector:

Injects oil into the A/C system during service to lubricate components.

## Subject: 4 Automobile Body Repair

### Mapped to ASC/N1499

#### Core-Elective-1

#### Terminal Outcomes:

Understanding Automobile Body Construction:

- Describe the construction and materials used in modern automobile bodies, including frame types, panels, and structural components.

Safety Protocols:

- Demonstrate a thorough understanding of safety protocols and practices in an automotive body repair workshop, including the use of personal protective equipment (PPE).

Tool and Equipment Proficiency:

- Proficiently use a variety of hand tools and power tools specific to automobile body repair, such as welders, grinders, sanders, and dent repair tools.

Surface Preparation Techniques:

- Prepare vehicle surfaces for repair by sanding, priming, and masking to ensure proper adhesion of paint and other finishes.

Panel Repair and Replacement:

- Repair damaged body panels using techniques such as welding, dent pulling, and, if necessary, replace panels.

<b>Duration:</b> <30:00>	<b>Duration:</b> <60:00>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<p>Safety and Hazard Awareness:</p> <ul style="list-style-type: none"> <li>● Understand and apply safety protocols and hazard awareness specific to automobile body repair, including the use of personal protective equipment (PPE).</li> </ul> <p>Materials and Tools:</p> <ul style="list-style-type: none"> <li>● Identify and understand the properties of</li> </ul>	<p>Collision Damage Assessment:</p> <ul style="list-style-type: none"> <li>● Demonstrate the ability to assess and identify various types of collision damage on automotive bodies.</li> </ul> <p>Panel Straightening and Repair:</p> <ul style="list-style-type: none"> <li>● Perform panel straightening and repair techniques using appropriate tools, such as hammers, dollies, and hydraulic equipment.</li> </ul>

<p>materials commonly used in automotive body repair, such as metals, plastics, and composites.</p> <ul style="list-style-type: none"> <li>● Recognize and effectively use a variety of tools and equipment employed in body repair work.</li> </ul> <p>Damage Assessment:</p> <ul style="list-style-type: none"> <li>● Develop skills in visually inspecting and assessing vehicle body damage, including understanding the impact on structural integrity.</li> </ul> <p>Collision Repair Techniques:</p> <ul style="list-style-type: none"> <li>● Learn and apply various collision repair techniques, including dent removal, panel replacement, and frame straightening.</li> </ul> <p>Welding and Joining Processes:</p> <ul style="list-style-type: none"> <li>● Understand different welding and joining processes used in body repair, such as MIG welding, spot welding, and adhesive bonding.</li> </ul> <p>Panel Alignment and Fitment:</p> <ul style="list-style-type: none"> <li>● Demonstrate the ability to align and fit body panels accurately, ensuring proper gaps and contours.</li> </ul>	<p>Sheet Metal Replacement:</p> <ul style="list-style-type: none"> <li>● Replace damaged or corroded sheet metal components, including fenders, doors, and quarter panels.</li> </ul> <p>Welding Techniques:</p> <ul style="list-style-type: none"> <li>● Master welding techniques for various materials used in automotive bodies, including steel and aluminum.</li> </ul> <p>Surface Preparation:</p> <ul style="list-style-type: none"> <li>● Prepare surfaces for repair by removing paint, rust, and other contaminants using sanding, grinding, and chemical methods.</li> </ul> <p>Body Filling and Shaping:</p> <ul style="list-style-type: none"> <li>● Apply body fillers and shaping techniques to restore damaged surfaces to their original contours.</li> </ul> <p>Paint Matching and Application:</p> <ul style="list-style-type: none"> <li>● Apply paint matching principles and demonstrate proficiency in applying automotive paint using spray guns.</li> </ul>
<p><b>Classroom Aids:</b></p> <p>Whiteboard, marker pen, projector</p>	
<p><b>Tools, Equipment and Other Requirements</b></p> <p>Dent Repair Tools: Dent puller or suction cup dent puller. Slide hammer for pulling out dents. Body hammer and dolly set for shaping metal.</p> <p>Body Filler and Sanding Tools: Bondo or other body filler materials. Sandpaper in various grits. Sanding blocks and boards.</p> <p>Welding and Cutting Tools: MIG welder for metal inert gas welding. Oxy-acetylene torch for cutting and welding. Spot weld cutter for removing spot welds.</p> <p>Painting Equipment: Paint spray gun for applying primer, basecoat, and clearcoat. Paint mixing system for color matching. Paint booth for controlled painting environment.</p>	

**Masking and Prep Tools:**

- Masking tape and paper for protecting areas not being painted.
- Plastic sheeting or masking film.
- Paint guns and brushes for touch-ups.

**Panel Replacement Tools:**

- Panel puller or frame straightening equipment.
- Panel adhesive for attaching replacement panels.

## **Subject: 5 Automobile Paint Refinish**

### **Mapped to ASC/N1301**

#### **Core-Elective-2**

#### **Terminal Outcomes:**

**Color Matching and Mixing:**

- Demonstrate the ability to accurately match vehicle paint colors using color charts and mixing systems.

**Surface Preparation:**

- Perform thorough surface preparation, including sanding, masking, and cleaning, to ensure a smooth and clean substrate for paint application.

**Paint Application Techniques:**

- Apply automotive paint using various techniques, including spraying, blending, and fading, to achieve consistent and high-quality finishes.

**Knowledge of Paint Types:**

- Understand different types of automotive paints, including basecoats, clearcoats, and primers, and apply them appropriately in the refinishing process.

**Spray Gun Operation:**

- Operate and maintain spray guns effectively, ensuring proper atomization and coverage during paint application.

**Paint Defect Correction:**

- Identify and rectify common paint defects such as runs, sags, orange peel, and dirt in the finish.

**Understanding Paint Systems:**

- Comprehend the principles and components of modern paint systems, including waterborne and solvent-based systems.

<b>Duration:</b> <30:00>	<b>Duration:</b> <60:00>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<p>Understanding Paint Types:</p> <ul style="list-style-type: none"> <li>● Identify and differentiate between various automotive paint types, including basecoat, clearcoat, single-stage, and waterborne paints.</li> </ul> <p>Color Theory:</p> <ul style="list-style-type: none"> <li>● Understand color theory principles, including color mixing, blending, and achieving color accuracy in paint matching.</li> </ul> <p>Surface Preparation:</p> <ul style="list-style-type: none"> <li>● Learn the importance of proper surface preparation, including sanding, priming, and filling techniques to ensure a smooth and even surface for painting.</li> </ul> <p>Paint Application Techniques:</p> <ul style="list-style-type: none"> <li>● Comprehend various paint application techniques, such as spraying, brushing, and blending, and understand the factors affecting the quality of paint application.</li> </ul> <p>Spray Gun Operation:</p> <ul style="list-style-type: none"> <li>● Gain knowledge of spray gun operation, including adjusting air pressure, fluid flow, and spray pattern for optimal paint application.</li> </ul> <p>Masking and Taping:</p> <ul style="list-style-type: none"> <li>● Understand proper masking and taping techniques to protect areas not intended for painting and achieve clean paint lines.</li> </ul> <p>Paint Mixing and Matching:</p> <ul style="list-style-type: none"> <li>● Learn the process of mixing and matching paint colors, including the use of color charts, spectro-photometers, and computerized color-matching systems.</li> </ul>	<p>Surface Preparation:</p> <ul style="list-style-type: none"> <li>● Prepare the vehicle surface for painting, including sanding, cleaning, and masking.</li> </ul> <p>Color Matching:</p> <ul style="list-style-type: none"> <li>● Develop skills in accurately matching paint colors to ensure a seamless and uniform finish.</li> </ul> <p>Spray Gun Operation:</p> <ul style="list-style-type: none"> <li>● Demonstrate proficiency in the correct operation of spray guns for applying primer, basecoat, and clearcoat.</li> </ul> <p>Paint Mixing:</p> <ul style="list-style-type: none"> <li>● Understand the correct ratios and procedures for mixing different types of automotive paints, including basecoats and clearcoats.</li> </ul> <p>Panel Blending:</p> <ul style="list-style-type: none"> <li>● Learn techniques for blending new paint with existing finishes to achieve a smooth transition and color consistency.</li> </ul> <p>Masking Techniques:</p> <ul style="list-style-type: none"> <li>● Apply effective masking techniques to protect areas of the vehicle not intended for painting.</li> </ul> <p>Paint Application:</p> <ul style="list-style-type: none"> <li>● Develop the ability to apply paint evenly and consistently to achieve a high-quality finish.</li> </ul>
<b>Classroom Aids:</b>	
Whiteboard, marker pen, projector	
<b>Tools, Equipment and Other Requirements</b>	
<p>Spray Guns:</p> <ul style="list-style-type: none"> <li>HVLP (High Volume Low Pressure) spray guns for applying basecoats, clearcoats, and primers.</li> </ul>	

**Paint Booth:**

A well-ventilated and properly equipped paint booth with proper filtration and exhaust systems to ensure a clean and controlled environment.

**Paint Mixing Room:**

A dedicated room for mixing paint and preparing color formulations.

**Paint Mixing System:**

Computerized or manual paint mixing system for accurately creating custom paint colors.

**Sanding and Abrasives:**

Sandpaper and abrasive pads of various grits for surface preparation and smoothing.

**Sanding Blocks and Boards:**

Sanding blocks and boards for uniform sanding and feathering of edges.

**Masking Materials:**

Masking tape and paper for covering areas not to be painted, creating defined paint lines.

**Subject: 6 Applied Physics**

*Mapped to ASC/N9837*

**Terminal Outcomes:**

- The terminal outcomes of a course in Applied Physics encompass the knowledge, skills, and competencies that students are expected to have acquired by the end of the course. Applied Physics focuses on the practical application of physical principles to solve real-world problems and develop technologies.
- Foundational Knowledge: Demonstrate a strong understanding of fundamental physics concepts, including mechanics, electromagnetism, thermodynamics, and waves.
- Mathematical Proficiency: Apply advanced mathematical techniques to solve complex physics problems and equations.
- Critical Thinking and Problem Solving: Analyze and solve complex scientific problems using logical reasoning, critical thinking, and quantitative analysis.
- Experimental Techniques: Understand and apply experimental methods, including data collection, analysis, and interpretation, to validate physical theories.
- Technological Application: Apply physics principles to design, develop, and optimize technologies and systems, such as electronics, optics, and materials.

<b>Duration: &lt;60:00&gt;</b>	<b>Duration: &lt;90:00&gt;</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<ul style="list-style-type: none"> <li>• <b>Mechanics:</b> Understand the principles of motion, forces, and energy conservation. Learn to analyze motion, equilibrium, and dynamics of particles and rigid bodies.</li> <li>• <b>Electricity and Magnetism:</b> Grasp the fundamentals of electric and magnetic fields, Gauss's law, Ampère's law, and Faraday's law. Learn about capacitance, inductance, and electric circuits.</li> <li>• <b>Thermodynamics:</b> Understand the laws</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Experimental Techniques:</b> Develop proficiency in setting up and conducting experiments using scientific equipment, sensors, and data collection tools.</li> <li>• <b>Measurement and Data Analysis:</b> Learn how to make accurate measurements, record data, and analyze experimental results using statistical methods and data analysis software.</li> <li>• <b>Error Analysis:</b> Understand sources of measurement error, uncertainty</li> </ul>



<p>of thermodynamics, heat transfer, and thermal processes. Learn about energy conservation, heat engines, and refrigeration.</p> <ul style="list-style-type: none"> <li>• Waves and Oscillations: Comprehend wave properties, wave equations, and wave behavior. Study simple harmonic motion, resonance, and the behavior of mechanical and electromagnetic waves.</li> <li>• Optics: Gain knowledge of ray optics and wave optics. Learn about reflection, refraction, diffraction, polarization, and applications in optical systems.</li> <li>• Quantum Mechanics: Introduction to the principles of quantum physics, including wave-particle duality, quantization, and the behavior of particles at the atomic and subatomic levels.</li> <li>• Materials Science: Understand the properties and behavior of materials, including conductors, semiconductors, insulators, and their applications in electronics.</li> </ul>	<p>calculations, and techniques for minimizing experimental uncertainties.</p> <ul style="list-style-type: none"> <li>• Laboratory Safety: Demonstrate proper laboratory safety practices, including handling chemicals, wearing appropriate personal protective equipment (PPE), and following protocols.</li> <li>• Instrumentation Usage: Gain hands-on experience with laboratory instruments, such as oscilloscopes, spectrometers, microscopes, and electronic measurement tools.</li> <li>• Mechanics Experiments: Conduct experiments related to mechanics, including motion analysis, forces, friction, and conservation of energy.</li> </ul>
<p><b>Classroom Aids:</b></p>	
<p>Whiteboard, marker pen, projector</p>	
<p><b>Tools, Equipment and Other Requirements</b></p>	
<p><b>Measurement and Observation Tools:</b></p> <ul style="list-style-type: none"> <li>• Rulers, calipers, and micrometers for length measurements</li> <li>• Vernier calipers and micrometers for precise measurements</li> <li>• Protractors and goniometers for angle measurements</li> <li>• Stopwatch or timer for time measurements</li> <li>• Thermometers for temperature measurements</li> </ul> <p><b>Optical Equipment:</b></p> <ul style="list-style-type: none"> <li>• Light sources (lamps or lasers)</li> <li>• Optical benches and supports</li> <li>• Mirrors, lenses, and prisms for optical experiments</li> <li>• Polarizers and diffraction gratings</li> </ul> <p><b>Electrical Measurement Tools:</b></p> <ul style="list-style-type: none"> <li>• Multimeters for voltage, current, and resistance measurements</li> <li>• Oscilloscopes for visualizing electrical signals</li> <li>• Function generators for producing varying electrical signals</li> <li>• Breadboards and electronic components for circuit experiments</li> </ul> <p><b>Mechanical Equipment:</b></p> <ul style="list-style-type: none"> <li>• Pulleys, springs, masses, and pendulums for mechanics experiments</li> <li>• Inclined planes and friction surfaces for studying forces</li> <li>• Balances for mass measurements</li> <li>• Force sensors or load cells for force measurements</li> <li>•</li> </ul>	

## Semester-2

### Subject: 1 Automobile System wise Performance Testing (Mechanical)

#### Mapped to ASC/N1496

#### Terminal Outcomes:

Understanding of Automobile Systems:

- Demonstrate a comprehensive understanding of various mechanical systems in automobiles, including the engine, transmission, suspension, steering, and braking systems.

Performance Testing Techniques:

- Acquire proficiency in using performance testing techniques for mechanical systems to evaluate and diagnose issues accurately.

Engine Performance Testing:

- Conduct engine performance testing, including assessments of power output, fuel efficiency, and emissions.

Transmission Performance Testing:

- Perform performance tests on transmissions to assess shifting smoothness, clutch engagement, and overall transmission efficiency.

Suspension and Steering Performance Testing:

- Evaluate suspension and steering systems for proper functionality, including assessments of ride quality, handling, and alignment.

Braking System Performance Testing:

- Conduct performance tests on braking systems to assess stopping distances, brake efficiency, and anti-lock braking system (ABS) functionality.

Diagnostic Skills:

- Develop advanced diagnostic skills to identify and troubleshoot mechanical issues affecting overall system performance.

<b>Duration:</b> <15:00>	<b>Duration:</b> <30:00>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<p>Understanding System Components:</p> <ul style="list-style-type: none"> <li>● Identify and explain the key components of major mechanical systems in automobiles, including the engine, transmission, suspension, steering, and braking systems.</li> </ul>	<p>Engine Performance Testing:</p> <ul style="list-style-type: none"> <li>● Conduct and interpret engine performance tests, including compression tests, cylinder leakage tests, and power output tests.</li> <li>● Identify and diagnose common engine</li> </ul>

<p><b>Principles of Operation:</b></p> <ul style="list-style-type: none"> <li>● Understand the fundamental principles of operation for each mechanical system, including the conversion of energy, power transmission, and mechanical force distribution.</li> </ul> <p><b>Performance Parameters:</b></p> <ul style="list-style-type: none"> <li>● Define and discuss the critical performance parameters for different mechanical systems, such as horsepower, torque, efficiency, and wear characteristics.</li> </ul> <p><b>Engine Performance Testing:</b></p> <ul style="list-style-type: none"> <li>● Explain the procedures for testing and evaluating the performance of internal combustion engines, including power output, fuel efficiency, and emission levels.</li> </ul> <p><b>Transmission Performance Testing:</b></p> <ul style="list-style-type: none"> <li>● Describe the methods for testing the performance of transmissions, including gear shifting, torque conversion, and efficiency.</li> </ul> <p><b>Suspension and Steering System Testing:</b></p> <ul style="list-style-type: none"> <li>● Discuss the techniques for assessing the performance of suspension and steering systems, covering aspects like ride comfort, stability, and handling characteristics.</li> </ul> <p><b>Braking System Performance Testing:</b></p> <ul style="list-style-type: none"> <li>● Understand the principles of braking system operation and describe the procedures for evaluating braking performance, including stopping distances and brake efficiency.</li> </ul>	<p>performance issues and recommend appropriate corrective actions.</p> <p><b>Fuel System Performance Testing:</b></p> <ul style="list-style-type: none"> <li>● Perform fuel system tests, including fuel pressure tests, injector flow tests, and fuel pump tests.</li> <li>● Analyze and troubleshoot fuel system problems such as poor fuel delivery and injector malfunctions.</li> </ul> <p><b>Ignition System Performance Testing:</b></p> <ul style="list-style-type: none"> <li>● Conduct ignition system tests, including spark plug analysis, ignition timing tests, and spark output tests.</li> <li>● Identify and rectify ignition system issues affecting engine performance.</li> </ul> <p><b>Exhaust System Performance Testing:</b></p> <ul style="list-style-type: none"> <li>● Evaluate exhaust system performance through backpressure tests and emission level measurements.</li> <li>● Diagnose and address exhaust system inefficiencies and emission control problems.</li> </ul> <p><b>Transmission System Performance Testing:</b></p> <ul style="list-style-type: none"> <li>● Perform transmission fluid pressure tests and torque converter tests.</li> <li>● Diagnose and rectify transmission-related performance issues, such as slipping and shifting problems.</li> </ul> <p><b>Suspension System Performance Testing:</b></p> <ul style="list-style-type: none"> <li>● Conduct suspension system tests, including shock absorber tests and wheel alignment assessments.</li> <li>● Identify and address issues affecting ride quality and vehicle handling.</li> </ul> <p><b>Braking System Performance Testing:</b></p> <ul style="list-style-type: none"> <li>● Perform braking system tests, including brake pad wear tests and brake fluid quality tests.</li> <li>● Diagnose and address braking system issues, such as uneven braking and loss of braking efficiency.</li> </ul>
<p><b>Classroom Aids:</b></p>	
<p>Whiteboard, marker pen, projector</p>	
<p><b>Tools, Equipment and Other Requirements</b></p>	

#### Engine Performance Testing:

- Engine dynamometer for measuring engine power and torque.
- Exhaust gas analyzer for analyzing exhaust emissions.
- Compression tester for checking cylinder compression.
- Vacuum gauge for assessing engine vacuum.
- Tachometer for measuring engine RPM.

#### Fuel System Performance Testing:

- Fuel pressure gauge for checking fuel pressure.
- Fuel injector tester for assessing injector performance.
- Fuel flow meter for measuring fuel flow rates.

#### Ignition System Performance Testing:

- Ignition timing light for checking and adjusting ignition timing.
- Spark plug tester for assessing spark plug functionality.
- Ignition system analyzer for diagnosing ignition system issues.

#### Cooling System Performance Testing:

- Coolant pressure tester for checking the cooling system pressure.
- Infrared thermometer for measuring coolant temperature.
- Radiator pressure tester for assessing radiator integrity.

#### Exhaust System Performance Testing:

- Back pressure gauge for measuring exhaust system back pressure.
- Infrared thermometer for measuring exhaust gas temperatures.

#### Brake System Performance Testing:

- Brake fluid tester for assessing brake fluid condition.
- Brake caliper tool for checking brake caliper operation.
- Brake lathe for machining brake rotors.

#### Suspension System Performance Testing:

- Shock absorber tester for evaluating shock absorber performance.
- Spring tester for measuring spring rates.

## Subject: 2 Quality Management

### *Mapped to ASC/N6315*

#### Terminal Outcomes:

- Quality management is a systematic approach to ensuring that products, services, and processes consistently meet or exceed customer expectations and organizational standards. The terminal outcomes of quality management reflect the goals and objectives of implementing effective quality control and assurance practices within an organization.

- **Consistent Product Quality:** Achieving a high level of consistency in product quality, where products meet defined specifications and standards in every production run.
- **Customer Satisfaction:** Ensuring that customers are consistently satisfied with the quality of products and services, leading to positive feedback, repeat business, and brand loyalty.
- **Defect Reduction:** Minimizing defects and non-conformities in products and processes through continuous improvement efforts, leading to improved efficiency and reduced waste.
- **Process Improvement:** Implementing processes for identifying inefficiencies, bottlenecks, and waste, and systematically improving these processes to enhance overall productivity and quality.

<b>Duration: &lt;15:00&gt;</b>	<b>Duration: &lt;30:00&gt;</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<p><b>Quality Concepts and Definitions:</b></p> <ul style="list-style-type: none"> <li>• Understanding the fundamental concepts of quality, including customer satisfaction, fitness for use, and meeting or exceeding expectations.</li> </ul> <p><b>Quality Standards and Frameworks:</b></p> <ul style="list-style-type: none"> <li>• Familiarity with internationally recognized quality standards such as ISO 9001 and industry-specific quality frameworks.</li> </ul> <p><b>Quality Philosophy and Culture:</b></p> <ul style="list-style-type: none"> <li>• Appreciating the importance of a quality-oriented organizational culture that emphasizes continuous improvement and customer focus.</li> </ul> <p><b>Total Quality Management (TQM):</b></p> <ul style="list-style-type: none"> <li>• Understanding the principles of TQM, which include customer focus, process improvement, employee involvement, and data-driven decision-making.</li> </ul> <p><b>Quality Management Principles:</b></p> <ul style="list-style-type: none"> <li>• Learning the core principles of quality management, including leadership commitment, customer focus, process approach, and continual improvement.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Quality Inspection and Testing:</b></li> <li>• Developing the ability to conduct quality inspections and tests using appropriate tools and techniques to ensure products meet specifications.</li> <li>• <b>Process Monitoring and Control:</b></li> <li>• Learning to monitor and control manufacturing processes using statistical process control (SPC) methods to maintain consistent quality.</li> <li>• <b>Data Collection and Analysis:</b></li> <li>• Gathering relevant data from processes, analyzing trends, identifying patterns, and making informed decisions based on data insights.</li> <li>• <b>Root Cause Analysis Techniques:</b></li> <li>• Applying techniques such as the 5 Whys, Fishbone Diagrams, and Failure Mode and Effects Analysis (FMEA) to identify root causes of quality issues.</li> <li>• <b>Continuous Improvement Projects:</b></li> <li>• Participating in or leading improvement projects using methodologies like Lean, Six Sigma, or Kaizen to eliminate defects and optimize processes.</li> </ul>
<b>Classroom Aids:</b>	
Whiteboard, marker pen, projector	
<b>Tools, Equipment and Other Requirements</b>	
<p><b>Measuring and Inspection Tools:</b></p> <ul style="list-style-type: none"> <li>• Calipers: Used for precise measurements of dimensions.</li> <li>• Micrometers: Instruments for accurate measurements of small distances.</li> <li>• Gauges: Tools for measuring tolerances, thread sizes, and more.</li> <li>• Dial indicators: Used for measuring linear displacement.</li> <li>• Height gauges: Instruments for measuring vertical distances and heights.</li> <li>• Vernier scales: Tools for measuring length with high accuracy.</li> </ul> <p><b>Testing Equipment:</b></p> <ul style="list-style-type: none"> <li>• Hardness testers: Devices to measure material hardness.</li> <li>• Tensile testing machines: Used to test the strength and mechanical properties of materials.</li> </ul>	

- Impact testers: Instruments to assess the impact resistance of materials.
  - Coordinate measuring machines (CMM): Used for dimensional measurements of complex components.
- Statistical Process Control (SPC) Tools:
- Control charts: Graphical tools to monitor process stability and variability.
  - Pareto charts: Used to identify and prioritize the most significant issues.
  - Histograms: Visual representations of data distribution.
- Root Cause Analysis Tools:
- Fishbone Diagrams (Ishikawa diagrams): Tools to identify potential causes of a problem.
  - 5 Whys: A technique to iteratively ask "why" to uncover the root cause of an issue.

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## **Subject: 3 Automobile System wise Performance Testing (Electrical & Electronics)**

### ***Mapped to ASC/N1497***

#### **Terminal Outcomes:**

##### **Comprehensive Understanding:**

- Demonstrate a comprehensive understanding of electrical and electronic systems in automobiles, including components, circuits, and their interconnections.

##### **Diagnostic Skill Development:**

- Develop advanced diagnostic skills to identify, analyze, and troubleshoot electrical and electronic issues in automotive systems.

##### **Testing Equipment Proficiency:**

- Proficiently use a variety of testing equipment, including multimeters, oscilloscopes, scan tools, and other diagnostic devices, for performance testing.

##### **Electrical Circuit Analysis:**

- Analyze and interpret electrical circuits in automotive systems to identify potential faults or performance issues.

##### **Sensor and Actuator Testing:**

- Conduct performance testing on various sensors and actuators, such as oxygen sensors, throttle position sensors, and solenoids, to ensure proper functionality.

##### **Battery and Charging System Testing:**

- Perform comprehensive testing of batteries and charging systems to assess their health and identify issues related to alternators and voltage regulators.

<b>Duration: &lt;15:00&gt;</b>	<b>Duration: &lt;30:00&gt;</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<p><b>Understanding Automotive Electrical Systems:</b></p> <ul style="list-style-type: none"> <li>● Explain the fundamentals of automotive electrical systems, including the battery, alternator, starter motor, and related components.</li> </ul> <p><b>Electrical Circuit Analysis:</b></p> <ul style="list-style-type: none"> <li>● Analyze and interpret electrical circuit diagrams and schematics relevant to automotive systems.</li> </ul> <p><b>Battery Technology:</b></p> <ul style="list-style-type: none"> <li>● Describe the construction, types, and functioning of automotive batteries.</li> <li>● Understand battery charging and discharging processes.</li> </ul> <p><b>Charging System Diagnostics:</b></p> <ul style="list-style-type: none"> <li>● Explain the operation of the alternator and voltage regulator.</li> <li>● Perform diagnostic tests on charging systems and interpret results.</li> </ul> <p><b>Starting System Diagnostics:</b></p> <ul style="list-style-type: none"> <li>● Understand the components of the starting system, including the starter motor and ignition switch.</li> <li>● Conduct diagnostic tests on starting systems.</li> </ul> <p><b>Ignition System Theory:</b></p> <ul style="list-style-type: none"> <li>● Explain the principles of ignition systems, including distributor-based and distributorless ignition systems.</li> <li>● Understand the role of ignition coils, spark plugs, and ignition control modules.</li> </ul> <p><b>Electronic Fuel Injection (EFI) Systems:</b></p> <ul style="list-style-type: none"> <li>● Describe the operation of electronic fuel</li> </ul>	<p><b>Battery Testing:</b></p> <ul style="list-style-type: none"> <li>● Conduct battery load tests to assess battery health and determine if it needs replacement.</li> <li>● Use a hydrometer and multimeter to measure specific gravity and voltage of batteries.</li> </ul> <p><b>Charging System Testing:</b></p> <ul style="list-style-type: none"> <li>● Perform alternator output tests to check the charging system's ability to generate and supply electrical power to the battery.</li> <li>● Test voltage regulator functionality and adjust if necessary.</li> </ul> <p><b>Starter System Testing:</b></p> <ul style="list-style-type: none"> <li>● Conduct starter motor tests to evaluate its performance and identify issues such as solenoid or motor failures.</li> <li>● Test and diagnose ignition switch problems affecting the starter.</li> </ul> <p><b>Ignition System Testing:</b></p> <ul style="list-style-type: none"> <li>● Use diagnostic tools to test ignition coils, spark plugs, and ignition control modules for proper functioning.</li> <li>● Perform ignition timing tests and adjustments.</li> </ul>

<p>injection systems.</p> <ul style="list-style-type: none"> <li>● Understand the components of EFI systems, such as sensors, injectors, and the Engine Control Module (ECM).</li> </ul> <p>Sensor Technology:</p> <ul style="list-style-type: none"> <li>● Identify and explain the role of various sensors in automotive systems, including temperature sensors, oxygen sensors, and position sensors.</li> </ul> <p>Actuator Technology:</p> <ul style="list-style-type: none"> <li>● Understand the functioning of actuators such as solenoids and relays in automotive electrical systems.</li> </ul>	<p>Sensor Testing:</p> <ul style="list-style-type: none"> <li>● Test various sensors, such as the crankshaft position sensor, camshaft position sensor, and oxygen sensors, using multimeters and oscilloscopes.</li> <li>● Interpret sensor readings to diagnose engine performance issues.</li> </ul> <p>Actuator Testing:</p> <ul style="list-style-type: none"> <li>● Test electronic actuators like fuel injectors and idle air control valves for proper operation.</li> <li>● Use diagnostic tools to assess the performance of throttle position sensors.</li> </ul> <p>Electronic Control Module (ECM) Testing:</p> <ul style="list-style-type: none"> <li>● Use scan tools and diagnostic software to communicate with and test the ECM.</li> <li>● Interpret trouble codes and perform software updates or reflashing as needed.</li> </ul>
<b>Classroom Aids:</b>	
Whiteboard, marker pen, projector	
<b>Tools, Equipment and Other Requirements</b>	
Multimeter:	
<ul style="list-style-type: none"> <li>● Digital multimeter for measuring voltage, current, and resistance in electrical circuits.</li> </ul>	
Oscilloscope:	
<ul style="list-style-type: none"> <li>● Digital oscilloscope for visualizing and analyzing electrical signals in real-time.</li> </ul>	
Scan Tool:	
<ul style="list-style-type: none"> <li>● Advanced automotive diagnostic scan tool for reading and interpreting data from the vehicle's onboard computer systems.</li> </ul>	
Battery Tester:	
<ul style="list-style-type: none"> <li>● Battery tester for evaluating the condition and performance of automotive batteries.</li> </ul>	
Battery Charger:	



- Automotive battery charger for charging and maintaining batteries.

Circuit Tester:

- Circuit tester or test light for checking the presence of electrical power and ground.

Power Probe:

- Power probe for testing and diagnosing electrical circuits.

Signal Generator:

- Signal generator for creating specific electrical signals to test sensors and components.

Current Clamp Meter:

- Clamp meter for measuring current flow in a circuit without breaking the circuit.

## **Subject: 4 Spare Parts Inventory Management**

### ***Mapped to ASC/N1302***

#### **Core-Elective-1**

##### **Terminal Outcomes:**

Inventory System Proficiency:

- Participants can proficiently use an automotive spare parts inventory management system, understanding its features and functionalities.

Inventory Classification:

- Participants can classify spare parts inventory based on criteria such as demand frequency, criticality, and storage requirements.

Ordering and Reordering Strategies:

- Participants understand effective strategies for ordering and reordering spare parts to maintain optimal inventory levels while minimizing excess.

Stock Rotation Practices:

- Participants implement stock rotation practices to ensure that older inventory is utilized first, reducing the risk of obsolescence.

Supplier Relationship Management:

- Participants develop skills in managing relationships with suppliers, negotiating terms, and ensuring timely and accurate deliveries.

Forecasting and Demand Planning:

- Participants can use historical data and market trends to forecast demand for spare parts, aiding in proactive inventory management.

<b>Duration:</b> <30:00>	<b>Duration:</b> <60:00>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<p>Understanding Inventory Management:</p> <ul style="list-style-type: none"> <li>● Define the concept of inventory management in the context of automotive service and its significance for efficient operations.</li> </ul> <p>Inventory Classification:</p> <ul style="list-style-type: none"> <li>● Understand the classification of spare parts inventory based on factors such as demand, criticality, and value.</li> </ul> <p>Inventory Control Methods:</p> <ul style="list-style-type: none"> <li>● Explain various inventory control methods, including ABC analysis, Just-In-Time (JIT), and Economic Order Quantity (EOQ).</li> </ul> <p>Supply Chain Management:</p> <ul style="list-style-type: none"> <li>● Describe the role of spare parts inventory management within the broader context of automotive supply chain management.</li> </ul> <p>Parts Identification and Coding:</p> <ul style="list-style-type: none"> <li>● Understand the importance of standardized part identification and coding systems for efficient inventory tracking.</li> </ul> <p>Spare Parts Catalogs:</p> <ul style="list-style-type: none"> <li>● Explain the use and importance of spare parts catalogs in identifying, ordering, and managing inventory.</li> </ul>	<p>Inventory Organization:</p> <ul style="list-style-type: none"> <li>● Develop the ability to organize spare parts inventory systematically, including proper categorization, labeling, and storage.</li> </ul> <p>Stocking Strategies:</p> <ul style="list-style-type: none"> <li>● Understand and implement different stocking strategies, such as ABC analysis, to prioritize and manage high-demand and critical spare parts.</li> </ul> <p>Inventory Tracking Systems:</p> <ul style="list-style-type: none"> <li>● Gain proficiency in using inventory tracking systems, whether manual or computerized, to monitor stock levels, reorder points, and part locations.</li> </ul> <p>Reordering Processes:</p> <ul style="list-style-type: none"> <li>● Learn effective procedures for initiating reorder requests, including setting reorder points, reviewing stock levels, and placing orders with suppliers.</li> </ul> <p>Vendor Relations:</p> <ul style="list-style-type: none"> <li>● Develop skills in building and maintaining positive relationships with vendors and suppliers to ensure timely and cost-effective procurement of spare parts.</li> </ul> <p>Obsolete Inventory Management:</p> <ul style="list-style-type: none"> <li>● Understand strategies for dealing with obsolete or slow-moving inventory, such as discounting, returning, or liquidating outdated parts.</li> </ul>
<b>Classroom Aids:</b>	
Whiteboard, marker pen, projector	
<b>Tools, Equipment and Other Requirements</b>	
Inventory Management Software:	
<ul style="list-style-type: none"> <li>● Utilize specialized inventory management software to simulate real-world inventory control</li> </ul>	

scenarios. Popular software includes tools like Zoho Inventory, QuickBooks, or industry-specific solutions.

#### Barcode Scanners:

- Introduce barcode scanners for scanning and tracking parts. This helps in efficient data entry and reduces the likelihood of errors.

#### RFID Technology:

- Explore RFID (Radio Frequency Identification) technology for advanced tracking and monitoring of spare parts within the inventory.

#### Computers and Laptops:

- Provide access to computers or laptops for training on digital inventory management platforms and software.

#### Inventory Tracking System Setup:

- Demonstrate the setup and configuration of an inventory tracking system, including defining categories, part numbers, and other relevant data.

#### Labeling Supplies:

- Ensure access to labeling supplies such as barcode labels, RFID tags, and other identification markers.

#### Shelving and Storage Units:

- Emphasize the importance of proper storage units, including shelves, racks, and bins, to organize and store spare parts efficiently.

## **Subject: 5 Warranty Management**

### ***Mapped to ASC/N1303***

#### **Core-Elective-2**

#### **Terminal Outcomes:**

##### Understanding Warranty Policies:

- Students should be able to understand and interpret automotive warranty policies, including coverage periods, terms, and conditions.

##### Warranty Claim Processing:

- Develop skills in processing warranty claims efficiently, adhering to manufacturer and industry guidelines.

##### Documentation and Record-Keeping:

- Demonstrate the ability to maintain accurate and organized records of warranty claims, including documentation of repairs, parts replacements, and customer information.

**Communication Skills:**

- Develop effective communication skills for liaising with manufacturers, suppliers, and customers regarding warranty-related matters.

**Customer Service in Warranty Management:**

- Learn how to provide excellent customer service during the warranty process, addressing customer concerns and inquiries.

**Diagnostic and Troubleshooting Skills:**

- Acquire diagnostic and troubleshooting skills to accurately identify warranty-related issues and determine whether they are covered by warranty.

**Warranty Parts Management:**

- Understand the proper procedures for managing warranty parts, including ordering, receiving, and returning defective components to manufacturers.

<b>Duration: &lt;30:00&gt;</b>	<b>Duration: &lt;60:00&gt;</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<p><b>Understanding Warranty Concepts:</b></p> <ul style="list-style-type: none"> <li>● Gain a comprehensive understanding of warranty concepts, including the definition of warranty, types of warranties, and the legal and regulatory aspects associated with warranty management.</li> </ul> <p><b>Warranty Policy Analysis:</b></p> <ul style="list-style-type: none"> <li>● Analyze and interpret warranty policies provided by automotive manufacturers, identifying key terms, conditions, and coverage details.</li> </ul> <p><b>Warranty Claim Processes:</b></p> <ul style="list-style-type: none"> <li>● Understand the end-to-end warranty claim processes, from the initial claim submission to reimbursement or parts replacement.</li> </ul> <p><b>Warranty Coverage Determination:</b></p> <ul style="list-style-type: none"> <li>● Learn how to determine and assess warranty coverage for various automotive</li> </ul>	<p><b>Understanding Warranty Concepts:</b></p> <ul style="list-style-type: none"> <li>● Demonstrate a clear understanding of warranty concepts and terminology used in the automotive service industry.</li> </ul> <p><b>Warranty Policy Analysis:</b></p> <ul style="list-style-type: none"> <li>● Analyze and interpret warranty policies provided by automotive manufacturers or extended warranty providers.</li> </ul> <p><b>Warranty Claim Documentation:</b></p> <ul style="list-style-type: none"> <li>● Learn how to accurately document and complete warranty claims, including required paperwork and digital submission processes.</li> </ul> <p><b>Claims Submission Process:</b></p> <ul style="list-style-type: none"> <li>● Understand the procedures for submitting warranty claims to manufacturers or warranty providers, ensuring compliance with their specific requirements.</li> </ul>

<p>components and systems.</p> <p><b>Manufacturer Requirements:</b></p> <ul style="list-style-type: none"> <li>● Understand and comply with specific requirements imposed by manufacturers regarding warranty procedures, documentation, and reporting.</li> </ul> <p><b>Documentation and Record Keeping:</b></p> <ul style="list-style-type: none"> <li>● Develop skills in maintaining accurate and detailed records related to warranty claims, including service documentation, part replacements, and customer interactions.</li> </ul> <p><b>Warranty Administration Software:</b></p> <ul style="list-style-type: none"> <li>● Familiarize oneself with the use of warranty administration software tools commonly employed in the automotive service industry.</li> </ul>	<p><b>Warranty Approval Process:</b></p> <ul style="list-style-type: none"> <li>● Gain knowledge of the steps involved in the warranty approval process, including the criteria for approving or denying warranty claims.</li> </ul> <p><b>Communication with Manufacturers:</b></p> <ul style="list-style-type: none"> <li>● Develop effective communication skills for interacting with manufacturers or warranty providers regarding claim status, additional information requests, and dispute resolution.</li> </ul> <p><b>Warranty Parts Return Process:</b></p> <ul style="list-style-type: none"> <li>● Understand the process of returning warranty parts, including proper documentation and packaging requirements.</li> </ul>
<b>Classroom Aids:</b>	
Whiteboard, marker pen, projector	
<b>Tools, Equipment and Other Requirements</b>	
<p><b>Computer and Software:</b></p> <ul style="list-style-type: none"> <li>● Computer systems with access to warranty management software and relevant databases.</li> </ul> <p><b>Training Manuals and Documentation:</b></p> <ul style="list-style-type: none"> <li>● Comprehensive training materials, manuals, and documentation related to warranty management processes, policies, and procedures.</li> </ul> <p><b>Warranty Claim Forms:</b></p> <ul style="list-style-type: none"> <li>● Sample warranty claim forms to practice filling out and processing warranty claims.</li> </ul> <p><b>Electronic Diagnostic Tools:</b></p> <ul style="list-style-type: none"> <li>● Diagnostic tools and equipment for demonstrating warranty-related diagnostic procedures on vehicles.</li> </ul> <p><b>Shop Management Software:</b></p> <ul style="list-style-type: none"> <li>● Access to automotive shop management software that includes modules for warranty tracking and reporting.</li> </ul> <p><b>Warranty Policy Documents:</b></p> <ul style="list-style-type: none"> <li>● Copies of actual warranty policies from automotive manufacturers for reference and analysis.</li> </ul>	

## Subject: 6 English Language Skills

### Mapped to ASC/N9839

#### Terminal Outcomes:

- Terminal outcomes of English language skills refer to the ultimate goals and achievements that individuals aim to attain through the development and mastery of their English language abilities. Proficiency in English is essential for effective communication, academic success, professional growth, and cultural engagement.
- **Effective Communication:** Achieving the ability to communicate fluently, accurately, and confidently in both spoken and written English across various contexts and audiences.
- **Comprehensive Reading:** Being able to comprehend and analyze a wide range of texts, including literature, articles, reports, and academic materials.
- **Expressive Writing:** Demonstrating the capacity to write coherent, organized, and persuasive pieces in English, ranging from essays and reports to creative works.
- **Listening Comprehension:** Developing the skill to understand spoken English in various accents, speeds, and contexts, including conversations, lectures, podcasts, and media.
- **Cultural Awareness:** Gaining an understanding of English-speaking cultures, their values, customs, and norms, and showing sensitivity to cultural differences.

<b>Duration: &lt;60:00&gt;</b>	<b>Duration: &lt;90:00&gt;</b>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<p>Language Structure and Grammar:</p> <ul style="list-style-type: none"> <li>• Understanding the basic components of English grammar, including parts of speech, sentence structure, verb tenses, and subject-verb agreement.</li> </ul> <p>Vocabulary and Word Usage:</p> <ul style="list-style-type: none"> <li>• Building a robust vocabulary and learning to use words effectively in context, including synonyms, antonyms, idiomatic expressions, and collocations.</li> </ul> <p>Phonetics and Pronunciation:</p> <ul style="list-style-type: none"> <li>• Familiarity with phonetic symbols, sound patterns, stress, intonation, and pronunciation rules to enhance spoken communication.</li> </ul> <p>Reading Comprehension Strategies:</p> <ul style="list-style-type: none"> <li>• Learning techniques to comprehend written texts effectively, such as skimming, scanning, inference, summarization, and critical analysis.</li> </ul> <p>Listening and Speaking Skills:</p> <ul style="list-style-type: none"> <li>• Developing active listening skills, note-taking strategies, and effective speaking techniques for clear and coherent verbal communication.</li> </ul> <p>Writing Process and Organization:</p>	<ul style="list-style-type: none"> <li>• <b>Effective Spoken Communication:</b> Engaging in conversations, discussions, and presentations with clarity, appropriate tone, and effective use of verbal communication strategies.</li> <li>• <b>Listening and Note-Taking:</b> Actively listening to spoken English, extracting key information, and taking meaningful notes during lectures, meetings, or presentations.</li> <li>• <b>Interactive Language Use:</b> Applying appropriate language register and communication techniques for various social settings, such as formal meetings, casual conversations, and interviews.</li> <li>• <b>Language Adaptation:</b> Adapting language use to different audiences, contexts, and levels of formality, ensuring effective communication across diverse situations.</li> <li>• <b>Reading Comprehension and Analysis:</b> Reading and comprehending a variety of texts, including articles, reports, academic papers, and literature, and</li> </ul>

<ul style="list-style-type: none"> <li>Understanding the stages of the writing process, from prewriting and drafting to revising, editing, and proofreading, to produce well-structured written pieces.</li> </ul> <p><b>Paragraph and Essay Structure:</b></p> <ul style="list-style-type: none"> <li>Mastering the organization and development of paragraphs and essays, including introduction, body, conclusion, topic sentences, and supporting details.</li> </ul> <p><b>Effective Communication Strategies:</b></p> <ul style="list-style-type: none"> <li>Learning strategies for maintaining effective communication in various situations, such as using appropriate tone, clarity, and nonverbal cues.</li> </ul>	<ul style="list-style-type: none"> <li>critically analyzing their content.</li> </ul> <p><b>Effective Writing Skills:</b></p> <ul style="list-style-type: none"> <li>Producing well-structured and organized written pieces, such as essays, reports, emails, and business correspondence, with clear expression and coherence.</li> </ul> <p><b>Creative Writing and Expression:</b></p> <ul style="list-style-type: none"> <li>Engaging in creative writing, such as short stories, poems, and narratives, to express ideas and emotions through literary forms.</li> </ul>
<b>Classroom Aids:</b>	
Whiteboard, marker pen, projector	
<b>Tools, Equipment and Other Requirements</b>	
<p><b>Books and Reading Materials:</b></p> <ul style="list-style-type: none"> <li>A variety of books, novels, magazines, newspapers, and online articles in English to improve reading comprehension, vocabulary, and exposure to different writing styles.</li> </ul> <p><b>Online Language Learning Platforms:</b></p> <ul style="list-style-type: none"> <li>Websites and apps like Duolingo, Babbel, Rosetta Stone, and Memrise offer interactive lessons, quizzes, and exercises to practice reading, writing, listening, and speaking skills.</li> </ul> <p><b>English Language Learning Apps:</b></p> <ul style="list-style-type: none"> <li>Mobile apps like Anki, Quizlet, and FluentU provide vocabulary flashcards, interactive exercises, and video content to enhance language skills.</li> </ul> <p><b>English Language Dictionaries:</b></p> <ul style="list-style-type: none"> <li>Online dictionaries like Merriam-Webster, Oxford English Dictionary, and Cambridge Dictionary for instant definitions, pronunciation, and usage examples.</li> </ul> <p><b>Language Exchange Platforms:</b></p> <ul style="list-style-type: none"> <li>Online platforms like Tandem, HelloTalk, and Speaky connect learners with native speakers for language exchange and real-time practice.</li> </ul>	

## Subject 7: Introduction to Employability Skills (120 Hours)

### Mapped to DGT/VSQ/N0104

#### Terminal Outcomes:

- Discuss about Employability Skills in meeting the job requirements

<b>Duration:</b> <48:00>	<b>Duration:</b> <72:00>
<b>Theory – Key Learning Outcomes</b>	<b>Practical – Key Learning Outcomes</b>
<p><b>Problem-Solving and Critical Thinking:</b></p> <ul style="list-style-type: none"> <li>Enhancing the ability to analyze</li> </ul>	<p><b>Problem-Solving and Decision-Making:</b></p> <ul style="list-style-type: none"> <li>Identifying workplace challenges,</li> </ul>

<p>complex situations, identify issues, generate innovative solutions, and make informed decisions.</p> <p><b>Adaptability and Flexibility:</b></p> <ul style="list-style-type: none"> <li>Learning to embrace change, adjust to new situations, and remain open to learning and growth in dynamic work environments.</li> </ul> <p><b>Time Management and Organization:</b></p> <ul style="list-style-type: none"> <li>Developing skills to prioritize tasks, manage time efficiently, set goals, and meet deadlines to ensure optimal productivity.</li> </ul> <p><b>Leadership and Influence:</b></p> <ul style="list-style-type: none"> <li>Understanding leadership qualities, motivating others, taking initiative, and being a positive influence on team dynamics.</li> </ul> <p><b>Conflict Resolution and Negotiation:</b></p> <ul style="list-style-type: none"> <li>Acquiring skills to manage conflicts constructively, communicate differences, and negotiate win-win solutions.</li> </ul> <p><b>Emotional Intelligence:</b></p> <ul style="list-style-type: none"> <li>Developing self-awareness, empathy, and the ability to manage emotions effectively, fostering positive relationships and communication.</li> </ul> <p><b>Interpersonal Skills:</b></p> <ul style="list-style-type: none"> <li>Enhancing social skills, active listening, empathy, and building rapport with colleagues, clients, and stakeholders.</li> </ul>	<p>analyzing situations, and making informed decisions to resolve issues efficiently.</p> <p><b>Adapting to Change:</b></p> <ul style="list-style-type: none"> <li>Demonstrating flexibility and resilience by adapting to changes in tasks, procedures, and priorities while maintaining a positive attitude.</li> </ul> <p><b>Time Management and Productivity:</b></p> <ul style="list-style-type: none"> <li>Effectively managing tasks, setting priorities, and using time management techniques to meet deadlines and achieve goals.</li> </ul> <p><b>Taking Leadership Initiative:</b></p> <ul style="list-style-type: none"> <li>Assuming leadership roles when appropriate, delegating tasks, motivating team members, and driving projects forward.</li> </ul> <p><b>Conflict Resolution in Practice:</b></p> <ul style="list-style-type: none"> <li>Applying conflict resolution techniques to address disagreements or misunderstandings in a constructive and collaborative manner.</li> </ul> <p><b>Emotional Intelligence in Interactions:</b></p> <ul style="list-style-type: none"> <li>Demonstrating self-awareness and empathy in interactions, managing emotions, and fostering positive relationships.</li> </ul> <p><b>Building Professional Relationships:</b></p> <ul style="list-style-type: none"> <li>Actively networking, building connections, and maintaining professional relationships that contributes to career growth.</li> </ul> <p><b>Effective Negotiation Skills:</b></p> <ul style="list-style-type: none"> <li>Applying negotiation strategies to reach mutually beneficial agreements and resolve conflicts while maintaining positive relationships.</li> </ul>
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**Classroom Aids:**

Whiteboard, marker pen, projector

**Tools, Equipment and Other Requirements**

**Online Courses and Workshops:**

Platforms like Coursera, Udemy, and LinkedIn Learning offer courses on communication, leadership, time management, conflict resolution, and other soft skills.

**Books and EBooks:**

Numerous books provide guidance on developing soft skills, such as "Emotional Intelligence" by Daniel Goleman and "Crucial Conversations" by Kerry Patterson.

**Podcasts and Audiobooks:**

Listen to podcasts like "The Art of Charm," "The Tony Robbins Podcast," and "HBR IdeaCast" that discuss personal development, leadership, and communication.



### **Webinars and Seminars:**

Participate in online or in-person workshops, seminars, and webinars that focus on specific soft skills and offer practical insights.

### **Language Learning Apps:**

Apps like Duolingo and Babbel can improve communication skills, language proficiency, and cross-cultural communication.

### **Online Learning Communities:**

Join forums, online groups, and communities focused on professional development and soft skills to connect with others and share experiences.

### **Networking Events:**

Attend networking events, industry conferences, and workshops to practice networking and relationship-building skills.

# 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
“Automobile Technician (Diagnostics), version 1.0”. Minimum accepted score is 80%.	Recommended that the Assessor is certified for the job role “Assessor (VET and Skills)”, Mapped to Qualification Pack: MEP/Q2701, V2.0” 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
“Automobile Technician (Diagnostics), version 1.0”. Minimum accepted score is 80%.	“Recommended that the Assessor is certified for the job role “Assessor (VET and Skills)”, Mapped to Qualification Pack: MEP/Q2701, V2.0” 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 is 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 Semester-wise Curriculum.
  - 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

<b>Term</b>	<b>Description</b>
<b>Declarative Knowledge</b>	Declarative knowledge refers to facts, concepts and principles that need to be known and/or understood in order to accomplish a task or to solve a problem.
<b>Key Learning Outcome</b>	Key learning outcome is the statement of what a learner needs to know, understand and be able to do in order to achieve the terminal outcomes. A set of key learning outcomes will make up the training outcomes. Training outcome is specified in terms of knowledge, understanding (theory) and skills (practical application).
<b>OJT</b>	On-the-job training (Mandatory); trainees are mandated to complete specified hours of training on site
<b>Procedural Knowledge</b>	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.
<b>Training Outcome</b>	Training outcome is a statement of what a learner will know, understand and be able to do upon the completion of the training.
<b>Terminal Outcome</b>	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

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