



Model Curriculum

Qualification Name: Automobile Jr. Technician (Service and Maintenance)

NSQF Level: 3.5

Model Curriculum Version: 1.0

Automotive Skills Development Council |
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Table of Contents

- A. Training Parameters
- B. Program Overview
- C. Training Outcomes
- D. Mandatory & Elective Modules

Year	Semester	Subject	Subject Type
1	1	Metrology (Measurement)	Core Mandatory
	1	Basic of Automobile Technology	Core Mandatory
	1	Tools & Equipment	Core Mandatory
	1	Two-Wheeler Technology	Core Elective-1
	1	Engineering Drawing	Core Elective-2
	1	Workshop Safety	Non-Core
	2	Automobile Electrical System	Core Mandatory
	2	Automobile Electronics	Core Mandatory
	2	Advance Automobile Technology	Core Mandatory
	2	Electric Two or Three-Wheeler Technology	Core Elective-1
	2	Four-Wheeler Technology	Core Elective-2
	2	Applied Mathematics	Non-Core
	2	Employability Skills (120 hours)	ES
	2	Workshop Technology (Two-Wheeler)	Core Mandatory

- E. Trainer Requirements
- F. Assessor Requirements
- G. Assessment Strategies
- H. Reference
 - Glossary
 - Abbreviations & Acronyms

Training Parameters

Sector	Automotive
Sub-Sector	Vehicle Service and Repair
Occupation	Automobile Service Technician
Country	India
NSQF Level	3.5
Aligned to NCO/ISCO/ISIC Code	NCO-2015/7231.0101
Minimum Educational Qualification and Experience	10th Pass
Pre-Requisite License or Training	NA
Minimum Job Entry Age	15 years
Last Reviewed On	15/03/2024
Next Review Date	15/03/2027
NSQC Approval Date	15/03/2024
QP Version	1.0
Model Curriculum Creation Date	15/03/2024
Model Curriculum Valid Up to Date	15/03/2027
Model Curriculum Version	1.0
Minimum Duration of the Course	1200 Hours
Maximum Duration of the Course	1200 Hours

Program Overview

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

Training Outcomes

A Diploma in Automobile Jr. Technician (Service and Maintenance) is a specialized educational program that focuses on providing students with practical skills and theoretical knowledge related to Vehicle Service & Repair Technologies.

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

Basic Automotive Knowledge:

Demonstrate a fundamental understanding of the basic principles of automotive technology, including engine operation, vehicle systems, and components.

Safety Practices:

Apply safety protocols and practices in an automotive workshop, including the proper use of personal protective equipment (PPE), safe handling of tools, and awareness of potential hazards.

Tool Usage and Maintenance:

Proficiently use common automotive tools and equipment for routine maintenance and simple repairs. Understand basic tool maintenance practices.

Vehicle Inspection:

Conduct visual inspections of vehicles to identify common issues and perform basic diagnostic assessments.

Basic Maintenance Procedures:

Perform routine maintenance tasks such as oil changes, air filter replacements, tire rotations, and fluid level checks according to industry standards.

Battery Maintenance and Testing:

Test and maintain automotive batteries. Understand the basics of battery charging and replacement.

Fluid Services:

Perform fluid exchange procedures, including engine oil changes, coolant flushes, and brake fluid replacements.

Introduction to Electrical & Electronics Systems:

Understand basic electrical & electronic principles and demonstrate proficiency in handling electrical components such as batteries, starters, and alternators.

Brake System Basics:

Gain knowledge of brake system components and perform basic brake inspections. Understand the principles of braking systems.

Customer Interaction:

Develop communication skills for interacting with customers, understanding their concerns, and explaining basic automotive issues.

Use of Service Manuals:

Learn how to navigate and use service manuals and technical documentation for vehicle repair and maintenance.

Workshop Organization:

Understand the importance of a well-organized and clean workshop. Demonstrate effective work habits and time management.

- **Career Opportunities:**

Graduates should be prepared for entry-level positions in Automotive Service Industry

- **Continuing Education:**

A Diploma in Automobile Jr. Technician (Service and Maintenance) can also serve as a stepping stone for further education, such as pursuing a higher-level degree or certifications in specialized areas.

- **Mandatory & Elective Modules**

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

Subject Details	Subject code	Subject Type	Theory Duration	Practical Duration	On-the-Job Training Duration	Total Duration
Metrology (Measurement)	ASC/N6314	Core Mandatory	15:00	30:00	00:00	45:00
Basic of Automobile Technology	ASC/N1483	Core Mandatory	15:00	30:00	00:00	45:00
Tools & Equipment	ASC/N1484	Core Mandatory	15:00	30:00	00:00	45:00
Two-Wheeler Technology	ASC/N1485	Core Elective-1	30:00	60:00	00:00	90:00
Engineering Drawing	ASC/N6458	Core Elective-2				
Workshop Safety	ASC/N1486	Non-Core	60:00	90:00	00:00	150:00
Automobile Electrical System	ASC/N1487	Core Mandatory	15:00	30:00	00:00	45:00
Automobile Electronics	ASC/N1488	Core Mandatory	15:00	30:00	00:00	45:00
Advance Automobile Technology	ASC/N1489	Core Mandatory	15:00	30:00	00:00	45:00
Electric Two or Three-Wheeler Technology	ASC/N1490	Core Elective-1	30:00	60:00	00:00	90:00
Four-Wheeler Technology	ASC/N1491	Core Elective-2				
Applied Mathematics	ASC/N9835	Non-Core	60:00	90:00	00:00	150:00
Employability Skills (120 hours)	DGT/VSQ/0104	ES	48:00	72:00	00:00	120:00
Workshop Technology (Two-Wheeler)	ASC/N1492	Core Mandatory	00:00	00:00	330	330.00
Total Duration			318:00	552:00	330:00	1200:00

Subject Details

Semester-1

Subject: 1 Metrology (Measurements)

Mapped to ASC/N6314 V1.0

Terminal Outcomes:

- The terminal outcome of a study or training in metrology is typically the acquisition of comprehensive knowledge and skills related to measurement science and precision measurement techniques.

Duration: <15:00>	Duration: <30:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> Measurement Concepts: Understand the basic concepts of measurement, including accuracy, precision, repeatability, reproducibility, and trueness. International System of Units (SI): Familiarize oneself with the SI units and their definitions, as well as the history and significance of the international measurement system. Traceability: Comprehend the importance of traceability, which refers to the establishment of a measurement result's linkage to a recognized reference standard. Measurement Processes: Learn about the steps involved in conducting precise measurements, including selection of appropriate instruments, calibration, data collection, and analysis. 	<p>Instrument Familiarity: Gain hands-on experience with a variety of measurement instruments, such as calipers, micrometers, gauges, comparators, and coordinate measuring machines (CMMs).</p> <p>Instrument Operation: Learn how to operate different measurement instruments correctly, ensuring accurate and consistent results.</p> <p>Calibration Techniques: Develop proficiency in calibrating measurement instruments using reference standards, adjusting instruments as needed to ensure accuracy.</p> <p>Measurement Setup: Understand how to properly set up measurement systems, ensuring stability, precision, and repeatability.</p>
Classroom Aids:	
Whiteboard, marker pen, projector	
Tools, Equipment and Other Requirements	
<p>Calipers: Used to measure the dimensions of objects, calipers come in various forms, including vernier calipers, digital calipers, and dial calipers.</p> <p>Micrometers: These precision instruments measure very small distances with high accuracy. Types include outside micrometers, inside micrometers, and depth micrometers.</p> <p>Height Gauges: Used to measure the height of objects and distances between surfaces, height gauges provide accurate vertical measurements.</p> <p>Dial Indicators: These devices measure small linear distances and are often used in conjunction with other tools for comparative measurements.</p>	

Gauge Blocks: Precision metal blocks of known dimensions used as a reference for calibrating measuring equipment.

Subject: 2 Basic of Automobile Technology

Mapped to ASC/N1483 V1.0

Terminal Outcomes:

Basic Automotive Knowledge:

- Demonstrate a fundamental understanding of the basic principles of automotive technology, including engine operation, vehicle systems, and components.

Safety Practices:

- Apply safety protocols and practices in an automotive workshop, including the proper use of personal protective equipment (PPE), safe handling of tools, and awareness of potential hazards.

Tool Usage and Maintenance:

- Proficiently use common automotive tools and equipment for routine maintenance and simple repairs. Understand basic tool maintenance practices.

Vehicle Inspection:

- Conduct visual inspections of vehicles to identify common issues and perform basic diagnostic assessments.

Basic Maintenance Procedures:

- Perform routine maintenance tasks such as oil changes, air filter replacements, tire rotations, and fluid level checks according to industry standards.

Duration: <15:00>	Duration: <30:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<p>Understanding Automotive Systems:</p> <ul style="list-style-type: none"> • Develop a comprehensive understanding of the major systems in an automobile, including the engine, transmission, suspension, braking, electrical, and steering systems. <p>Engine Operation:</p> <ul style="list-style-type: none"> • Explain the basic principles of internal combustion engines, including the four-stroke cycle, engine components, and the role of key engine parts. <p>Vehicle Dynamics:</p> <ul style="list-style-type: none"> • Understand the fundamental principles of vehicle dynamics, including weight distribution, center of gravity, and the impact of these factors on vehicle performance and handling. <p>Powertrain Components:</p> <ul style="list-style-type: none"> • Identify and explain the functions of powertrain components, such as the transmission, differential, and 	<p>Understanding Automotive Systems:</p> <ul style="list-style-type: none"> • Identify and understand the basic systems of an automobile, including the engine, transmission, suspension, braking, and electrical systems. <p>Vehicle Identification:</p> <ul style="list-style-type: none"> • Learn to identify different types of vehicles, their makes, models, and variations based on visual cues. <p>Tools and Equipment Familiarity:</p> <ul style="list-style-type: none"> • Develop familiarity with common automotive tools and equipment used in a workshop, including hand tools, power tools, and diagnostic equipment. <p>Safety Practices:</p> <ul style="list-style-type: none"> • Demonstrate adherence to safety protocols in an automotive workshop, including the use of personal protective equipment (PPE), safe handling of tools, and awareness of potential hazards. <p>Basic Vehicle Maintenance:</p>

<p>drivetrain.</p> <p>Basic Electrical Systems:</p> <ul style="list-style-type: none"> Gain knowledge of basic electrical concepts in automotive systems, including the battery, alternator, starter, and various electrical components. 	<ul style="list-style-type: none"> Perform routine maintenance tasks such as checking and topping up fluids, inspecting belts and hoses, and understanding the importance of regular maintenance.
<p>Classroom Aids:</p>	
<p>Whiteboard, marker pen, projector</p>	
<p>Tools, Equipment and Other Requirements</p>	
<p>Basic Hand Tools:</p> <ul style="list-style-type: none"> Wrench set (combination wrenches, socket wrenches) Screwdrivers (flathead and Phillips) Pliers (regular, needle-nose, locking pliers) Hammers (ball-peen, rubber mallet) Allen wrenches (hex keys) <p>Toolboxes or Tool Cabinets:</p> <ul style="list-style-type: none"> Storage for organizing and keeping hand tools easily accessible. <p>Safety Equipment:</p> <ul style="list-style-type: none"> Personal protective equipment (PPE) for students and instructors, including safety glasses, gloves, and hearing protection. <p>Cutting Tools:</p> <ul style="list-style-type: none"> Utility knives or box cutters for cutting various materials. <p>Measuring Tools:</p> <ul style="list-style-type: none"> Tape measure Calipers for precise measurements <p>Marking Tools:</p> <ul style="list-style-type: none"> Permanent markers Chalk or grease pencils for marking components <p>Lubrication Equipment:</p> <ul style="list-style-type: none"> Grease gun for lubricating moving parts Oil dispensers or funnels for oiling components <p>Battery Charger and Tester:</p> <ul style="list-style-type: none"> For testing and charging automotive batteries. 	

Subject: 3 Tools & Equipment

Mapped to ASC/N1484 V1.0

Terminal Outcomes:

Tool Identification and Selection:

- Students can accurately identify a variety of automotive tools and equipment commonly used in automotive service.
- Students understand the appropriate use of each tool and can select the right tool for specific tasks.

Tool Handling and Safety:

- Students demonstrate safe and proper handling of automotive tools and equipment.
- Students understand and follow safety protocols when using tools, ensuring their own safety and the safety of others.

Maintenance and Calibration:

- Students are capable of performing basic maintenance tasks on tools and equipment to ensure their proper functioning.
- Students understand the importance of regular calibration and follow procedures to maintain accuracy.

Diagnostic Tool Proficiency:

- Students can effectively use diagnostic tools, such as multimeters and OBD-II scan tools, to troubleshoot and diagnose automotive issues.

Duration: <15:00>	Duration: <30:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<p>Tool Classification and Identification:</p> <ul style="list-style-type: none"> • Classify and identify various tools used in automotive service based on their function and application. <p>Basic Mechanical Principles:</p> <ul style="list-style-type: none"> • Understand fundamental mechanical principles related to force, motion, and torque that influence the design and use of automotive tools. <p>Tool Materials and Manufacturing:</p> <ul style="list-style-type: none"> • Explore the materials used in manufacturing automotive tools and understand how different materials affect tool durability, strength, and performance. <p>Ergonomics and Human Factors:</p> <ul style="list-style-type: none"> • Gain knowledge of ergonomic principles related to tool design and usage to ensure user comfort, efficiency, and safety. <p>Tool Maintenance and Calibration:</p> <ul style="list-style-type: none"> • Comprehend the importance of regular maintenance and calibration of tools to ensure accuracy, reliability, and longevity. <p>Diagnostic Tools and Equipment:</p> <ul style="list-style-type: none"> • Understand the principles behind diagnostic tools, such as multimeters, oscilloscopes, and OBD-II scanners, and their applications in automotive diagnostics. <p>Advanced Automotive Service Equipment:</p> <ul style="list-style-type: none"> • Explore advanced automotive service equipment, including wheel alignment machines, tire balancers, and engine analyzers, and understand their functions and applications. 	<p>Tool Identification and Familiarity:</p> <ul style="list-style-type: none"> • Identify and name a wide range of automotive tools commonly used in the automotive service industry. • Develop familiarity with the physical characteristics, functions, and applications of different tools. <p>Safe Handling and Usage:</p> <ul style="list-style-type: none"> • Demonstrate safe and proper handling of automotive tools, including correct grip, posture, and tool operation techniques. • Follow safety protocols to minimize the risk of accidents and injuries during tool usage. <p>Tool Maintenance and Calibration:</p> <ul style="list-style-type: none"> • Perform routine maintenance tasks on common automotive tools, such as cleaning, lubricating, and checking for wear. • Calibrate precision tools to ensure accurate measurements and readings. <p>Diagnostic Tool Proficiency:</p> <ul style="list-style-type: none"> • Use diagnostic tools, such as multimeters and OBD-II scan tools, to troubleshoot and diagnose basic automotive issues. • Interpret diagnostic tool readings and make informed decisions based on the data obtained. <p>Operation of Advanced Equipment:</p> <ul style="list-style-type: none"> • Operate advanced automotive service equipment, including alignment machines, tire balancers, and engine analyzers. • Understand and navigate the user interfaces of complex equipment to achieve accurate results. <p>Specialized Tool Application:</p> <ul style="list-style-type: none"> • Apply specialized tools for specific automotive tasks, such as brake service tools, engine diagnostic tools, and suspension tools. • Demonstrate proficiency in using

	<p>specialized tools for efficient and precise work.</p> <p>Efficient Shop Organization:</p> <ul style="list-style-type: none"> • Arrange and organize tools in the workshop to ensure easy access and efficient workflow. • Understand the importance of a well-organized workspace for productivity and safety.
Classroom Aids:	
Whiteboard, marker pen, projector	
Tools, Equipment and Other Requirements	
<p>Basic Hand Tools:</p> <ul style="list-style-type: none"> ● Wrench set (combination wrenches, socket wrenches) ● Screwdrivers (flathead and Phillips) ● Pliers (regular, needle-nose, locking pliers) ● Hammers (ball-peen, rubber mallet) ● Allen wrenches (hex keys) <p>Diagnostic Tools:</p> <ul style="list-style-type: none"> ● Multimeter for measuring voltage, current, and resistance. ● OBD-II scan tool for reading and interpreting vehicle diagnostic trouble codes (DTCs). <p>Specialized Automotive Tools:</p> <ul style="list-style-type: none"> ● Brake service tools (caliper tool, brake fluid bleeder kit) ● Engine diagnostic tools (compression tester, timing light) ● Suspension tools (ball joint separator, strut spring compressor) ● Steering system tools (tie rod end puller, power steering pump pulley remover) ● Transmission and drivetrain tools (transmission jack, differential gear puller) <p>Battery Tools:</p> <ul style="list-style-type: none"> ● Battery tester and charger ● Battery terminal cleaner <p>Air Conditioning Service Tools:</p> <ul style="list-style-type: none"> ● Refrigerant recovery machine ● A/C manifold gauge set 	

Subject: 4 Two-Wheeler Technology

Mapped to ASC/1485, v1.0

Core-Elective-1

Terminal Outcomes:

Two-Wheeler Systems Understanding:

- Students demonstrate a comprehensive understanding of the various systems in two-wheeler vehicles, including the engine, transmission, chassis, suspension, and braking systems.

Identification and Selection of Components:

- Students can identify and select key components and parts used in two-wheeler technology, including engine components, electrical systems, and chassis elements.

Maintenance and Routine Service:

- Students are proficient in performing routine maintenance tasks on two-wheelers, such as oil changes, brake adjustments, and air filter replacements, following industry-standard procedures.

Duration: <30:00>	Duration: <60:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<p>Understanding Two-Wheeler Systems:</p> <ul style="list-style-type: none"> Define and explain the major systems in a two-wheeler, including the engine, transmission, chassis, suspension, and braking systems. <p>Engine Operation and Components:</p> <ul style="list-style-type: none"> Describe the basic principles of internal combustion engines used in two-wheelers. Identify and explain the function of major engine components, such as the piston, crankshaft, camshaft, and cylinder head. <p>Fuel Systems:</p> <ul style="list-style-type: none"> Understand different types of fuel delivery systems used in two-wheelers, including carburetors and fuel injection systems. Explain the fuel-air mixture formation and combustion process in a two-wheeler engine. <p>Ignition Systems:</p> <ul style="list-style-type: none"> Explain the principles of ignition systems used in two-wheelers, covering points ignition, electronic ignition, and spark plug technology. 	<p>Identification of Two-Wheeler Components:</p> <ul style="list-style-type: none"> Students should be able to identify and name various components of a two-wheeler, including the engine, frame, suspension, brakes, and electrical systems. <p>Basic Maintenance Procedures:</p> <ul style="list-style-type: none"> Perform routine maintenance tasks, such as oil changes, air filter replacements, and spark plug inspections, following manufacturer guidelines. <p>Tire and Wheel Service:</p> <ul style="list-style-type: none"> Demonstrate the proper techniques for removing and installing motorcycle tires, balancing wheels, and adjusting tire pressure. <p>Brake System Servicing:</p> <ul style="list-style-type: none"> Perform brake inspections, replace brake pads, bleed brake systems, and adjust brake components for optimal performance and safety. <p>Engine Performance and Tune-Up:</p> <ul style="list-style-type: none"> Conduct basic engine tune-ups, including adjusting carburetors, checking ignition timing, and inspecting the exhaust system.
Classroom Aids:	
Whiteboard, marker pen, projector	
Tools, Equipment and Other Requirements	
<p>Basic Hand Tools:</p> <ul style="list-style-type: none"> Wrench set (combination wrenches, socket wrenches) Screwdrivers (flathead and Phillips) Pliers (regular, needle-nose, locking pliers) Hammers (ball-peen, rubber mallet) Allen wrenches (hex keys) <p>Diagnostic Tools:</p> <ul style="list-style-type: none"> Multimeter for measuring voltage, current, and resistance. Compression tester for checking engine compression. Spark plug tester. <p>Specialized Two-Wheeler Tools:</p> <ul style="list-style-type: none"> Chain breaker and riveter for motorcycle chain maintenance. Clutch holding tool for clutch adjustments. Wheel balancer and truing stand for wheel maintenance. <p>Engine Tools:</p> <ul style="list-style-type: none"> Piston ring compressor for engine work. Valve spring compressor for valve adjustments. <p>Suspension and Steering Tools:</p> <ul style="list-style-type: none"> Fork seal driver for front fork maintenance. Steering head bearing race installer. 	

Subject: 5 Engineering Drawing

Mapped to ASC/N6458,v1.0

Core-Elective-2

Terminal Outcomes:

- Proficiency in creating technical drawings using industry-standard software and drafting techniques.
- Understanding of the principles of geometric dimensioning and tolerancing (GD&T), and how to apply them in engineering drawings.
- Familiarity with various types of engineering drawings, such as assembly drawings, detail drawings, and exploded views.
- Ability to interpret and understand engineering drawings created by others and make necessary modifications or updates.
- Understanding of the importance of clear and concise communication in engineering drawings, and how to effectively convey design intent.
- Knowledge of the various materials and processes used in manufacturing, and how to create drawings that accurately reflect these considerations.

Duration: <30:00>	Duration: <60:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Principles of geometric dimensioning and tolerancing (GD&T), including datum features, basic dimensions, and tolerances. • Various types of engineering drawings and their purposes, such as assembly drawings, detail drawings, and exploded views. • Drafting conventions and symbols used in engineering drawings, such as hatching, centrelines, and section views. • Materials and manufacturing processes, including how they affect drawing dimensions and tolerances. • Familiarity with industry standards for engineering drawing creation, such as ISO 128-2 and ASME Y14.5M. • Understanding of the importance of clear and concise communication in engineering drawings, including the use of notes, balloons, and callouts. • Familiarity with the latest trends and technologies in engineering drawing software and techniques, such as 3D modelling and parametric drawing. 	<ul style="list-style-type: none"> • Ability to read and interpret engineering drawings, including dimensions, tolerances, and symbols, using various drawing scales such as metric, imperial, or architectural scales. This includes understanding the different types of drawings such as assembly, detail, and exploded views, as well as the use of orthographic, isometric, and oblique projections. • Proficiency in creating engineering drawings using computer-aided design (CAD) software, including the ability to create 2D and 3D models, add dimensions, annotations, and labels, and generate various views and sections as required by specific engineering applications or industries. • Understanding of the principles of drafting, such as clear and concise labeling, use of standardized symbols and conventions, and adherence to industry standards for drawing formats and styles, including ANSI Y14, ISO 216, and ASME Y14M-2007 (United

	<p>States), DIN 276 (Germany), and BS 303 (United Kingdom).</p> <ul style="list-style-type: none"> • Familiarity with the use of engineering drawing software for creating technical illustrations, such as exploded views, isometric views, and assembly drawings, as well as the ability to create detailed parts lists and bills of materials (BOMs) for manufacturing and assembly purposes.
<p>Classroom Aids:</p>	
<p>Whiteboard, marker pen, projector</p>	
<p>Tools, Equipment and Other Requirements</p>	
<p>Computer with CAD software (such as AutoCAD or SolidWorks) and a large monitor. Drawing board or drafting table with a T-square or L-square for aligning drawings. Drawing pens or pencils in various sizes (such as 0.5mm, 0.7mm, 1mm, 2mm). Erasers (such as kneaded erasers or white vinyl erasers) for correcting mistakes. Ruler or measuring tape for accurately measuring dimensions. Protractor for measuring angles. Compass for drawing circles and arcs. Calculator for performing mathematical calculations. Lettering set for creating text and dimensions. Printer or plotter for printing or plotting the final drawings. Lighting for proper illumination of the drawing area. Storage solutions for organizing and storing drawings, such as filing cabinets or digital storage systems. Punch and die set for creating holes in the drawings. Technical pen set for creating fine lines and details. Cutting mat and cutting tool for trimming paper or acetate sheets.</p>	

Subject: 6 Workshop Safety

Mapped to ASC/N1486,v1.0

Terminal Outcomes:

Understanding of Workshop Hazards:

- Students can identify and understand common hazards present in an automotive service workshop, including electrical, chemical, mechanical, and ergonomic hazards.

Proper Use of Personal Protective Equipment (PPE):

- Students consistently use appropriate PPE, such as safety glasses, gloves, hearing protection, and respiratory protection, when required.

Emergency Response Skills:

- Students are trained in and can demonstrate effective responses to emergency situations, including fire emergencies, chemical spills, and accidents.

Safe Handling of Tools and Equipment:

- Students use tools and equipment safely, following proper operating procedures and manufacturer guidelines.
- Students understand and practice tool safety, including the correct use of lifting equipment and power tools.

Workshop Layout and Organization:

- Students understand the importance of a well-organized workshop layout for minimizing hazards and improving workflow.
- Students actively contribute to maintaining a clean and clutter-free workshop environment.

Duration: <60:00>	Duration: <90:00>
<p>Theory – Key Learning Outcomes</p> <p>Understanding Safety Regulations:</p> <ul style="list-style-type: none"> • Gain knowledge of relevant safety regulations, standards, and legal requirements applicable to automotive service workshops. <p>Identifying Workplace Hazards:</p> <ul style="list-style-type: none"> • Learn to identify and assess potential hazards in an automotive service workshop, including mechanical, chemical, electrical, and ergonomic hazards. <p>Personal Protective Equipment (PPE):</p> <ul style="list-style-type: none"> • Understand the importance of wearing and using appropriate personal protective equipment (PPE) and demonstrate the correct usage of safety gear such as safety glasses, gloves, hearing protection, and respiratory protection. <p>Safe Tool and Equipment Usage:</p> <ul style="list-style-type: none"> • Comprehend and apply safe operating procedures for various automotive tools and equipment, including power tools, lifting equipment, and diagnostic tools. <p>Emergency Procedures:</p> <ul style="list-style-type: none"> • Understand and memorize emergency procedures, including fire evacuation, first aid, and responses to spills or accidents in the workshop. 	<p>Practical – Key Learning Outcomes</p> <p>Understanding Safety Protocols:</p> <ul style="list-style-type: none"> • Students should be able to demonstrate a clear understanding of safety protocols and guidelines relevant to automotive service workshops. <p>Personal Protective Equipment (PPE):</p> <ul style="list-style-type: none"> • Students should know how to properly select, use, and maintain personal protective equipment, including safety glasses, gloves, hearing protection, and appropriate clothing. <p>Emergency Procedures:</p> <ul style="list-style-type: none"> • Students should be familiar with and able to follow emergency procedures, including evacuation routes, fire response, and first aid. <p>Tool and Equipment Safety:</p> <ul style="list-style-type: none"> • Students should understand the safe handling and usage of common automotive tools and equipment, including power tools and lifting devices.
<p>Classroom Aids: Whiteboard, marker pen, projector</p>	
<p>Tools, Equipment and Other Requirements</p> <p>Personal Protective Equipment (PPE):</p> <ul style="list-style-type: none"> • Hard Hats: Protect the head from falling objects and impact. • Safety Glasses and Goggles: Protect the eyes from debris, chemicals, and projectiles. • Hearing Protection: Earplugs or earmuffs to protect against loud noise. • Respirators and Masks: Protect against harmful dust, fumes, and airborne contaminants. 	

- **Gloves:** Different types for hand protection when handling hazardous materials or sharp objects.
- **Safety Footwear:** Steel-toed boots or shoes to protect the feet from heavy objects and impacts.
- **Protective Clothing:** Coveralls, aprons, and other specialized clothing to protect against chemicals, heat, and other hazards.

Fall Protection Equipment:

- **Safety Harnesses:** Prevent falls from heights by securing workers to a fixed anchor point.
- **Lanyards and Lifelines:** Attach to safety harnesses to prevent workers from falling.
- **Anchorage Points:** Secure points for attaching fall protection equipment.

Fire Safety Equipment:

- **Fire Extinguishers:** Portable devices to extinguish small fires.
- **Fire Blankets:** Used to smother fires and protect against flames and heat.
- **Emergency Exit Signs and Lighting:** Ensure safe evacuation during emergencies.

Semester-2

Subject: 1 Automobile Electrical System

Mapped to ASC/N1487, v1.0

Terminal Outcomes:

Understanding Electrical Principles:

- Demonstrate a thorough understanding of basic electrical principles, including voltage, current, resistance, and Ohm's Law, as they apply to automotive electrical systems.

Component Identification:

- Identify and describe the various electrical components in an automobile, including the battery, alternator, starter motor, ignition system, lighting system, and various sensors.

Circuit Analysis:

- Analyze and interpret automotive electrical circuits, including series and parallel circuits, using circuit diagrams and schematics.

Battery Maintenance and Testing:

- Demonstrate the ability to test, maintain, and troubleshoot automotive batteries, including checking voltage, specific gravity, and performing load tests.

Charging System Diagnosis:

- Diagnose and repair issues related to the charging system, including alternator testing, voltage regulation, and related components.

Duration: <15:00>	Duration: <30:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<p>Understanding Basic Electrical Principles:</p> <ul style="list-style-type: none"> • Explain fundamental electrical concepts, 	<p>Circuit Identification and Analysis:</p> <ul style="list-style-type: none"> • Identify and analyze automotive electrical circuits, including

<p>including voltage, current, resistance, and power.</p> <p>Overview of Vehicle Electrical Systems:</p> <ul style="list-style-type: none"> ● Understand the components and structure of an automotive electrical system, including the battery, alternator, starter motor, and various sensors. <p>Battery Technology:</p> <ul style="list-style-type: none"> ● Explain the function of a vehicle battery, its construction, types, and maintenance requirements. <p>Charging System Operation:</p> <ul style="list-style-type: none"> ● Describe the operation of the alternator, voltage regulator, and related components in the charging system. <p>Starting System Operation:</p> <ul style="list-style-type: none"> ● Understand the principles behind the starting system, including the starter motor, solenoid, and ignition switch. <p>Ignition System Operation:</p> <ul style="list-style-type: none"> ● Explain the operation of the ignition system, including distributor-based and distributor less ignition systems. <p>Electrical Wiring Diagrams:</p> <ul style="list-style-type: none"> ● Interpret and create electrical wiring diagrams for automotive systems. 	<p>understanding circuit diagrams and schematics.</p> <p>Component Identification and Testing:</p> <ul style="list-style-type: none"> ● Identify and test various electrical components in vehicles, such as batteries, alternators, starters, and ignition systems. <p>Battery Maintenance and Testing:</p> <ul style="list-style-type: none"> ● Performing maintenance tasks on automotive batteries and accurately testing battery health. <p>Charging System Diagnostics:</p> <ul style="list-style-type: none"> ● Diagnose and troubleshoot issues related to the charging system, including alternator testing and voltage regulation. <p>Starting System Diagnostics:</p> <ul style="list-style-type: none"> ● Diagnose and troubleshoot issues related to the starting system, including the starter motor and ignition switch. <p>Ignition System Diagnostics:</p> <ul style="list-style-type: none"> ● Diagnosing and troubleshooting ignition system components, including spark plugs, ignition coils, and ignition control modules. <p>Lighting System Maintenance and Repair:</p> <ul style="list-style-type: none"> ● Maintain and repair vehicle lighting systems, including headlights, taillights, brake lights, and turn signals.
Classroom Aids:	
Whiteboard, marker pen, projector	
Tools, Equipment and Other Requirements	
Multimeter:	
Digital multimeter for measuring voltage, current, and resistance in electrical circuits.	
Oscilloscope:	
An oscilloscope for visualizing and analyzing complex electrical waveforms in automotive systems.	
Test Lights and Probes:	
Test lights and probes for checking circuit continuity and identifying power sources.	

Battery Tester and Charger:

Equipment for testing and charging automotive batteries.

Circuit Testers:

Continuity testers for checking the flow of electrical current through a circuit.

Diagnostic Scan Tool:

OBD-II scan tool for reading and interpreting vehicle diagnostic trouble codes (DTCs) related to the electrical system.

Power Probe:

A power probe tool for testing and diagnosing electrical circuits.

Subject: 2 Automobile Electronics

Mapped to ASC/N1488, v1.0

Terminal Outcomes:

Understanding of Automotive Electronics:

- Demonstrate a comprehensive understanding of automotive electronic systems, including sensors, actuators, control units, and communication networks.

Electrical Circuit Analysis:

- Apply electrical circuit analysis principles to automotive electronic circuits, including voltage, current, resistance, and Ohm's Law.

Sensor and Actuator Operation:

- Explain the operation of various automotive sensors (e.g., temperature sensors, pressure sensors) and actuators (e.g., solenoids, motors) used in vehicle systems.

Electronic Control Units (ECUs):

- Understand the role and function of Electronic Control Units in controlling various vehicle systems, such as engine control modules (ECMs), transmission control modules (TCMs), and body control modules (BCMs).

Duration: <15:00>	Duration: <30:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<p>Understanding Basic Electronics Principles:</p> <ul style="list-style-type: none"> ● Develop a foundational understanding of basic electronic principles, including voltage, current, resistance, and circuit theory. 	<p>Understanding Electronic Components:</p> <ul style="list-style-type: none"> ● Identify and understand key electronic components used in automotive systems, such as sensors, actuators, relays, and control modules. <p>Circuit Diagnosis:</p> <ul style="list-style-type: none"> ● Develop the ability to diagnose

<p>Introduction to Automotive Electronics:</p> <ul style="list-style-type: none"> ● Comprehend the role of electronics in modern vehicles and the evolution of automotive electronics systems. <p>Vehicle Electrical System Overview:</p> <ul style="list-style-type: none"> ● Understand the structure and components of the vehicle's electrical system, including the battery, alternator, and starter. <p>Electronic Control Units (ECUs):</p> <ul style="list-style-type: none"> ● Learn about the various electronic control units in vehicles, including engine control units (ECUs), transmission control units (TCUs), and body control modules (BCMs). <p>Sensors and Actuators:</p> <ul style="list-style-type: none"> ● Understand the function and operation of sensors (e.g., temperature sensors, pressure sensors) and actuators (e.g., solenoids, motors) in automotive electronic systems. <p>Digital and Analog Electronics:</p> <ul style="list-style-type: none"> ● Differentiate between digital and analog electronic components and understand their respective applications in automotive systems. 	<p>electronic circuits using schematics, wiring diagrams, and multimeters.</p> <p>Scan Tool Proficiency:</p> <ul style="list-style-type: none"> ● Gain proficiency in using automotive diagnostic scan tools to retrieve and interpret data from onboard vehicle systems. <p>ECU Programming:</p> <ul style="list-style-type: none"> ● Understand the basics of electronic control unit (ECU) programming and reprogramming for vehicle systems. <p>Sensor and Actuator Testing:</p> <ul style="list-style-type: none"> ● Demonstrate the ability to test sensors and actuators for proper functionality, including using specialized testing equipment. <p>Oscilloscope Usage:</p> <ul style="list-style-type: none"> ● Use an oscilloscope for advanced electronic system diagnostics, waveform analysis, and signal integrity checks.
Classroom Aids:	
Whiteboard, marker pen, projector	
Tools, Equipment and Other Requirements	
<p>Diagnostic Scan Tool:</p> <ul style="list-style-type: none"> ● A professional-grade scan tool capable of reading and interpreting data from various vehicle electronic control modules (ECMs). <p>Multimeter:</p> <ul style="list-style-type: none"> ● Digital multimeter for measuring voltage, current, and resistance in automotive electrical circuits. <p>Oscilloscope:</p> <ul style="list-style-type: none"> ● An oscilloscope for visualizing and analyzing electrical waveforms in automotive systems. ● <p>Power Supply:</p> <ul style="list-style-type: none"> ● Variable power supply for simulating different voltage conditions in automotive electronics. ● <p>Wiring Diagrams and Technical Manuals:</p> <ul style="list-style-type: none"> ● Access to comprehensive wiring diagrams and technical manuals for various vehicle models. <p>Circuit Testers:</p>	

- Circuit testers for quickly checking the presence of electrical power in circuits.

Electrical Connector Tools:

- Terminal removal tools for safely removing terminals from connectors.
- Crimping tools for making proper electrical connections.

Battery Load Tester:

- Equipment for testing the condition and load-bearing capacity of automotive batteries.

Subject: 3 Advance Automobile Technology

Mapped to ASC/N1489, v1.0

Terminal Outcomes:

Advanced Systems Understanding:

Demonstrate a thorough understanding of advanced automotive systems, including engine management, transmission systems, electronic control units (ECUs), and chassis dynamics.

Diagnosis and Troubleshooting:

Apply advanced diagnostic techniques to identify and troubleshoot complex issues in vehicle systems, utilizing diagnostic tools and interpreting data from various sensors.

Vehicle Electronics and Networking:

Understand the intricacies of modern vehicle electronics, communication networks, and interconnected systems.

Hybrid and Electric Vehicle Technology:

Demonstrate knowledge of hybrid and electric vehicle technologies, including high-voltage systems, battery management, and regenerative braking.

Advanced Engine Performance:

Analyze and optimize engine performance through advanced tuning, calibration, and modification techniques.

Duration: <15:00>	Duration: <30:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<p>Understanding Advanced Vehicle Propulsion Systems:</p> <ul style="list-style-type: none"> • Describe and compare various advanced vehicle propulsion systems, including internal combustion engines, hybrid systems, electric powertrains, and hydrogen fuel cells. 	<p>Vehicle Diagnostics:</p> <ul style="list-style-type: none"> • Diagnose and troubleshoot complex issues in vehicle systems using advanced diagnostic tools and techniques. <p>Engine Performance:</p>

<p>Knowledge of Advanced Fuel Systems:</p> <ul style="list-style-type: none"> ● Explain the principles and characteristics of advanced fuel systems, such as direct injection, gasoline direct injection (GDI), and common rail diesel injection. <p>Advanced Engine Management Systems:</p> <ul style="list-style-type: none"> ● Understand the principles of advanced engine management systems, including electronic control units (ECUs), sensors, and actuators. Explain how these systems optimize engine performance and efficiency. <p>Electric and Hybrid Vehicle Technologies:</p> <ul style="list-style-type: none"> ● Describe the components and operation of electric and hybrid vehicle technologies, including batteries, electric motors, regenerative braking systems, and power electronics. 	<ul style="list-style-type: none"> ● Explore advanced engine technologies and be able to optimize engine performance through tuning and calibration. <p>Advanced Fuel Systems:</p> <ul style="list-style-type: none"> ● Diagnosing advanced fuel injection systems, direct injection, and alternative fuel systems. <p>Hybrid and Electric Vehicle Technology:</p> <ul style="list-style-type: none"> ● Exploration about hybrid and electric vehicle systems, including batteries, electric motors, and regenerative braking. <p>Transmission and Drivetrain Systems:</p> <ul style="list-style-type: none"> ● Understand advanced automatic and manual transmission technologies, including dual-clutch systems and continuously variable transmissions (CVTs).
<p>Classroom Aids:</p>	
<p>Whiteboard, marker pen, projector</p>	
<p>Tools, Equipment and Other Requirements</p>	
<p>Oscilloscope: A digital oscilloscope for analyzing and diagnosing complex electrical signals in vehicle systems.</p> <p>Scan Tool with Advanced Diagnostics: A professional-grade diagnostic scan tool capable of reading and interpreting advanced data from various vehicle modules.</p> <p>Advanced Engine Analyzer: An engine analyzer with advanced features for diagnosing engine performance issues.</p> <p>Vehicle Lifts: Hydraulic vehicle lifts for easy access to the undercarriage and various vehicle systems.</p> <p>Wheel Alignment System: Advanced wheel alignment system for diagnosing and correcting alignment issues.</p> <p>Chassis Dynamometer: A dynamometer for testing and evaluating the performance of the vehicle's engine and chassis.</p> <p>Emission Testing Equipment: Equipment for conducting emissions testing and analyzing exhaust gases.</p>	

Subject: 4 Electric Two or Three-Wheeler Technology

Mapped to ASC/N1490, v1.0

Core-Elective-1

Terminal Outcomes:

Understanding Electric Vehicle Principles:

- Students can demonstrate a comprehensive understanding of the principles and concepts underlying electric two or three-wheeler technology, including electric propulsion, energy storage, and power electronics.

Electric Powertrain Knowledge:

- Students can describe the components of an electric powertrain, including electric motors, controllers, and energy storage systems, and understand how they work together.

Battery Technology Proficiency:

- Students are proficient in handling, maintaining, and troubleshooting electric vehicle battery systems, including lithium-ion batteries.

Charging Infrastructure Familiarity:

- Students are familiar with electric vehicle charging infrastructure, including charging stations, connectors, and charging protocols.

Diagnostic and Troubleshooting Skills:

- Students possess the skills to diagnose and troubleshoot common issues in electric two or three-wheelers, using diagnostic tools and techniques.

Vehicle Control Systems Understanding:

- Students understand the operation of vehicle control systems, including electronic control units (ECUs), sensors, and communication networks within electric vehicles.

Duration: <30:00>	Duration: <60:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<p>Understanding Electric Vehicle Basics:</p> <ul style="list-style-type: none"> • Describe the fundamental principles of electric vehicles, including their components, operation, and advantages over traditional internal combustion engine vehicles. <p>Electric Powertrains:</p> <ul style="list-style-type: none"> • Explain the components of an electric powertrain, including the electric motor, power electronics, and the battery pack. Understand their functions and interactions. <p>Battery Technology:</p> <ul style="list-style-type: none"> • Describe different types of batteries used in electric two or three-wheelers, including lithium-ion, lead-acid, or other emerging technologies. Understand battery chemistry, charging, and discharging processes. 	<p>Electric Vehicle Components Identification:</p> <ul style="list-style-type: none"> • Identify and understand the function of key electric vehicle components, including the motor, battery, controller, and charging system. <p>Battery Management System (BMS):</p> <ul style="list-style-type: none"> • Understand the role of the Battery Management System in monitoring and controlling the performance and safety of the battery. <p>Charging Infrastructure:</p> <ul style="list-style-type: none"> • Familiar with different charging systems and be able to connect electric vehicles to charging stations. <p>Electric Motor Operation and Maintenance:</p> <ul style="list-style-type: none"> • Apply the principles of operation of electric motors and be able to perform basic maintenance tasks such as

<p>Charging Infrastructure:</p> <ul style="list-style-type: none"> Explain the basics of electric vehicle charging infrastructure, including different charging levels (Level 1, Level 2, DC fast charging), charging stations, and connectors. <p>Electric Motor Types:</p> <ul style="list-style-type: none"> Differentiate between various types of electric motors used in electric two or three-wheelers, such as brushed DC motors, brushless DC motors, and AC induction motors. 	<p>cleaning and lubrication.</p> <p>High-Voltage Safety Protocols:</p> <ul style="list-style-type: none"> Explore high-voltage safety protocols, including the use of personal protective equipment (PPE) and safe handling of high-voltage components. <p>Battery Maintenance and Safety:</p> <ul style="list-style-type: none"> Perform basic battery maintenance tasks, including checking and maintaining proper electrolyte levels (if applicable) and ensuring overall battery safety. <p>Electric Vehicle Diagnostic Skills:</p> <ul style="list-style-type: none"> Use diagnostic tools to identify and troubleshoot common issues in electric two or three-wheelers. <p>Electric Vehicle Charging and Range Management:</p> <ul style="list-style-type: none"> Manage and extend the range of electric vehicles and optimize charging patterns for efficiency.
<p>Classroom Aids:</p> <p>Whiteboard, marker pen, projector</p>	
<p>Tools, Equipment and Other Requirements</p>	
<p>Multimeter: Digital multimeter for measuring voltage, current, and resistance in electrical circuits.</p> <p>Insulation Resistance Tester: A tester for measuring the insulation resistance of electrical components.</p> <p>Battery Tester and Charger: Specialized equipment for testing and charging electric vehicle batteries.</p> <p>Electric Vehicle Charging Station: Access to an electric vehicle charging station for practical demonstrations.</p> <p>Diagnostic Scan Tool for Electric Vehicles: A diagnostic tool designed for electric vehicles, capable of reading and interpreting data from electric vehicle systems.</p> <p>Battery Management System (BMS) Tools: Tools for diagnosing and maintaining battery management systems in electric vehicles.</p> <p>Electric Motor Testing Equipment: Equipment for testing and analyzing electric motors used in electric two or three-wheelers.</p> <p>Electric Vehicle Controller Tester: A tool for testing and diagnosing electronic controllers in electric vehicles.</p> <p>Charging Infrastructure Components: Components related to charging infrastructure, including charging cables and connectors.</p>	

Subject: 5 Four-Wheeler Technology

Mapped to ASC/N1491,v1.0

Core-Elective-2

Terminal Outcomes:

Comprehensive Understanding of Four-Wheeler Systems:

- Students should demonstrate a thorough understanding of the various systems in four-wheelers, including engine, transmission, suspension, braking, steering, and electrical systems.

Diagnostic Proficiency:

- Students should be proficient in using diagnostic tools and techniques to identify and troubleshoot issues in four-wheeler systems.

Effective Vehicle Inspection:

- Students should be able to conduct comprehensive inspections of four-wheelers, identifying potential problems and recommending appropriate maintenance or repairs.

Routine Maintenance and Servicing:

- Students should be skilled in performing routine maintenance tasks, such as oil changes, fluid checks, tire rotations, and filter replacements, in accordance with industry standards.

Engine Performance Optimization:

- Students should be capable of optimizing engine performance through tuning, adjustments, and the use of diagnostic tools.

Duration: <30:00>	Duration: <60:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<p>Vehicle Dynamics:</p> <ul style="list-style-type: none"> ● Understand the principles of vehicle dynamics, including acceleration, braking, and handling characteristics. <p>Automotive Systems Overview:</p> <ul style="list-style-type: none"> ● Gain a comprehensive overview of the major systems in an automobile, including 	<p>Vehicle Identification:</p> <ul style="list-style-type: none"> ● Identify and differentiate various types of four-wheeled vehicles, including different makes and models. <p>Basic Automotive Systems Understanding:</p> <ul style="list-style-type: none"> ● Apply the fundamental understanding of the major automotive systems, including

<p>the engine, transmission, suspension, steering, braking, and electrical systems.</p> <p>Internal Combustion Engines:</p> <ul style="list-style-type: none"> ● Learn the working principles of internal combustion engines, including the four-stroke cycle, engine components, and combustion processes. <p>Transmission Systems:</p> <ul style="list-style-type: none"> ● Understand different types of transmission systems, including manual, automatic, and continuously variable transmissions (CVT). <p>Suspension and Steering Systems:</p> <ul style="list-style-type: none"> ● Study suspension systems, including independent and dependent systems, and understand the principles of steering geometry. <p>Braking Systems:</p> <ul style="list-style-type: none"> ● Explore various types of braking systems, including disc brakes, drum brakes, and anti-lock braking systems (ABS). 	<p>the engine, transmission, suspension, braking, and electrical systems.</p> <p>Vehicle Inspection and Diagnosis:</p> <ul style="list-style-type: none"> ● Perform visual inspections of vehicles, identify common issues, and conduct basic diagnostic assessments. <p>Routine Maintenance Procedures:</p> <ul style="list-style-type: none"> ● Perform routine maintenance tasks such as oil changes, air filter replacements, tire rotations, and fluid level checks. <p>Brake System Servicing:</p> <ul style="list-style-type: none"> ● Inspect, service, and repair brake systems, including disc and drum brakes. <p>Engine Performance:</p> <ul style="list-style-type: none"> ● Apply the basic engine performance principles and be able to diagnose and address common engine-related issues.
<p>Classroom Aids:</p>	
<p>Whiteboard, marker pen, projector</p>	
<p>Tools, Equipment and Other Requirements</p>	
<p>Basic Hand Tools:</p> <ul style="list-style-type: none"> Wrench set (combination wrenches, socket wrenches) Screwdrivers (flathead and Phillips) Pliers (regular, needle-nose, locking pliers) Hammers (ball-peen, rubber mallet) Allen wrenches (hex keys) <p>Diagnostic Tools:</p> <ul style="list-style-type: none"> OBD-II scan tool for reading and interpreting vehicle diagnostic trouble codes (DTCs). Engine analyzer for diagnosing engine performance issues. <p>Battery Tester and Charger:</p> <ul style="list-style-type: none"> Equipment for testing and charging automotive batteries. <p>Digital Multimeter:</p> <ul style="list-style-type: none"> For measuring voltage, current, and resistance in electrical circuits. <p>Vehicle Lifts:</p> <ul style="list-style-type: none"> Hydraulic vehicle lifts for easy access to the undercarriage and various vehicle systems. 	

Subject: 6 Applied Mathematics

Mapped to ASC/N9835,v1.0

Terminal Outcomes:

- Terminal outcomes of "Applied Mathematics" encompass the overall knowledge, skills, and competencies that students are expected to achieve by the end of the course. These outcomes reflect a comprehensive understanding of mathematical concepts and their practical applications.
- **Problem-Solving Skills:** Develop proficient problem-solving skills by applying mathematical concepts to solve real-world problems across various disciplines.
- **Mathematical Concepts Mastery:** Attain a deep understanding of fundamental mathematical concepts, including algebra, calculus, geometry, and statistics.
- **Mathematical Modelling:** Acquire the ability to create mathematical models to represent and analyze real-world phenomena and situations.
- **Data Analysis and Interpretation:** Develop skills to analyze and interpret data using statistical techniques, graphs, and visualization tools.
- **Engineering Applications:** Apply mathematical principles to engineering problems, such as mechanics, thermodynamics, electrical circuits, and fluid dynamics.

Duration: <60:00> Theory – Key Learning Outcomes	Duration: <90:00> Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Mathematical Concepts: Gain a thorough understanding of core mathematical concepts, including algebra, calculus, geometry, and linear algebra. • Mathematical Modelling: Learn how to create mathematical models that represent real-world phenomena, systems, and relationships. • Functions and Equations: Understand the properties and behaviour of functions and equations, including polynomial, exponential, logarithmic, and trigonometric functions. • Differential and Integral Calculus: Develop proficiency in differential and integral calculus, including concepts of limits, derivatives, and integrals. 	<ul style="list-style-type: none"> • Data Analysis and Interpretation: Acquire skills to collect, organize, and analyze data using statistical methods and tools. • Mathematical Modelling: Develop the ability to create mathematical models that represent real-world situations and phenomena accurately. • Problem-Solving Strategies: Apply mathematical techniques to solve practical problems in fields such as engineering, physics, economics, and more. • Optimization Techniques: Learn to optimize scenarios by applying mathematical methods to find optimal solutions in complex situations. • Numerical Computations: Gain practical experience in using numerical methods to solve mathematical problems that may not have analytical solutions.
Classroom Aids:	
Whiteboard, marker pen, projector	
Tools, Equipment and Other Requirements	
<ul style="list-style-type: none"> • Math Reference Books and Textbooks: 	

- Resources that provide explanations, examples, and techniques for applying mathematical concepts.
- Online Calculators and Solvers:
- Web-based tools that perform specific mathematical calculations or solve equations.
- Mathematical Databases and Tables:
- References for mathematical constants, formulas, and tables.

Subject 7: Introduction to Employability Skills (120 Hours)

Mapped to DGT/VSQ/N0104

Terminal Outcomes:

- Discuss about Employability Skills in meeting the job requirements

Duration: <48:00>	Duration: <72:00>
Theory – Key Learning Outcomes	Practical – Key Learning Outcomes
<ul style="list-style-type: none"> • Outline the importance of Employability Skills for the current job market and future of work • Self-Awareness and Personal Branding: Understand the importance of self-awareness, self-assessment, and personal branding in showcasing skills, strengths, and values to potential employers. • Communication Skills: Develop a strong foundation in effective verbal and written communication, including interpersonal communication, public speaking, and professional correspondence. • Teamwork and Collaboration: Understand the dynamics of effective teamwork, collaborative problem-solving, and building positive working relationships with colleagues. • Critical Thinking and Problem-Solving: Learn how to analyze complex situations, evaluate options, and make informed decisions using critical thinking and problem-solving techniques. 	<ul style="list-style-type: none"> • Effective Communication: Develop the ability to communicate clearly and confidently through written, verbal, and nonverbal means, adapting communication style to different contexts and audiences. • Professional Email and Correspondence: Acquire skills in writing professional emails, memos, and reports that convey information accurately and professionally. • Active Listening: Practice active listening techniques to understand and respond effectively to colleagues, clients, and supervisors. • Teamwork and Collaboration: Learn how to work collaboratively within diverse teams, contribute ideas, and respect others' viewpoints. • Time Management and Organization: Develop skills to prioritize tasks, set goals, and manage time effectively to meet deadlines and deliver results. • Problem-Solving and Critical Thinking: Enhance problem-solving skills by identifying issues, analyzing situations, and generating innovative solutions.
Classroom Aids:	
Whiteboard, marker pen, projector	
Tools, Equipment and Other Requirements	
Online Learning Platforms:	

Websites like Coursera, LinkedIn Learning, and Udemy offer courses on communication, teamwork, time management, leadership, and other employability skills.

Career Development Workshops and Seminars:

Attend workshops and seminars organized by universities, career centers, and professional organizations to enhance skills and gain insights into job-seeking strategies.

Online Skill Assessments:

Platforms like Indeed Assessments or Skillshare provide assessments that evaluate your skill levels and offer targeted skill improvement recommendations.

Networking Tools:

LinkedIn and other professional networking platforms help you connect with professionals in your field, expand your network, and learn from others' experiences.

Communication Tools:

Video conferencing tools like Zoom and Microsoft Teams enhance remote communication skills and virtual collaboration.

Presentation Software:

Tools like Microsoft PowerPoint or Google Slides help in creating and delivering effective presentations.

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 Jr. Technician (Service and Maintenance), 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/Auto mobile/ Electrical/ Electronics	1	Mechanical/Automobile/ Electrical/ Electronics	NA
M.E/M.Tech	Mechanical/Automobile/ Electrical/ Electronics	4	Mechanical/Auto mobile/ Electrical/ Electronics	0	Mechanical/Automobile/ Electrical/ Electronics	NA

Assessor Certification	
Domain Certification	Platform Certification
“Automobile Jr. Technician (Service and Maintenance), , 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

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	On-the-job training (Mandatory); trainees are mandated to complete specified hours of training on site
Procedural Knowledge	Procedural knowledge addresses how to do something, or how to perform a task. It is the ability to work, or produce a tangible work output by applying cognitive, affective or psychomotor skills.
Training Outcome	Training outcome is a statement of what a learner will know, understand and be able to do upon the completion of the training.
Terminal Outcome	Terminal outcome is a statement of what a learner will know, understand and be able to do upon the completion of a module. A set of terminal outcomes help to achieve the training outcome.

Acronyms and Abbreviations

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