

B .Voc in Automobile Servicing – Repair and Maintenance

Program Outcomes and Program Specific Outcomes

Program Outcomes: Automobile Servicing – Repair and Maintenance

After completion this course students can learn:

Vocational Education is education that prepares the students for specific trades, crafts and career sat various levels and scopes. It trains the students from a trade, technician or professional position in R & D organizations. The Program Outcomes are the skills and knowledge which the students have at each exit level/at the time of graduation. These Outcomes are generic and are common to all exit levels mentioned in the programme structure.

| <i>PO</i> | <i>Summary</i> | <i>Description</i> |
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| <i>PO1</i> | Basic knowledge | Apply knowledge of basic sciences, basic statistical, and fundamental engineering/ technology to solve the broad spectrum Automobile related problems. |
| <i>PO2</i> | Discipline knowledge & Problem Analysis | Apply transboundary knowledge of a broad spectrum of technology that encompasses (but not limited to) electronics, mechtronics, electrical, robotics and control system to identify Automobile related problems. |
| <i>PO3</i> | Design Development of solutions | Design / develop solutions for complex engineering or technological problems or challenges for Automobile related problems . |
| <i>PO4</i> | . Conduct Investigation of complex problems . | Use research based knowledge and research method including design of experiments/systems, analysis and interpretation of data and synthesis of information to provide valid conclusion |
| <i>PO5</i> | Modern tools | Apply relevant and recent Automobile technologies and tools with an understanding of the limitations. |
| <i>PO6</i> | The engineer and society | Assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to practice in field of Automobile. |
| <i>PO7</i> | Environment and sustainability | Apply Automobile solutions for sustainable development practices in societal and environmental contexts. |

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| PO8 | Ethics | Apply ethical principles for commitment to professional ethics, responsibilities and norms of the practice also in the field of Automobile. |
| PO9 | Individual and team work | Function effectively as a leader and team member in diverse/ multidisciplinary teams. |
| PO10 | Communication | Communicate effectively in oral and written form. |

Program Specific Outcomes: Automobile Servicing – Repair and Maintenance

After 3-4 years of completion of the program, students will be able to –

1. , their manufacturing and servicing & repair technology in solving complex problems in automotive field.
2. Design systems for motor vehicles, their manufacturing & servicing & repair sectors.
3. Diagnose faults in motor vehicles and its systems.

| Program Specific Outcomes Nos | Program Specific Outcomes (PSO) |
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| PSO1 | Apply knowledge of motor vehicles- An automobile engineering course typically covers a broad range of topics. Here's how knowledge from such a course can be applied practically, including maintenance, troubleshooting, and deeper technical understanding: |
| PSO2 | Oil Change : • Frequency: Typically every 3,000 to 5,000 miles, but check your vehicle's manual. • Reason of Oil Change - Keeps the engine lubricated, reduces friction, and prevents overheating. • Process of Oil Change :Replace old oil with new oil and change the oil filter. |
| PSO3 | Tyre Care :• Check Tyre Pressure: Regularly ensure they are inflated to the recommended PSI. • Rotate Tyres: Every 6,000 to 8,000 miles to ensure even wear. • Alignment and Balancing: Check if you experience uneven tire wear or handling issues. |
| PSO4 | • Brake : • Inspection: Check brake pads for wear and listen for squeaking or grinding noises. • Fluid Levels: Ensure brake fluid is at the recommended level. |

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| PSO5 | <p>Battery Maintenance :-</p> <ul style="list-style-type: none"> • Check Connections: Ensure battery terminals are clean and tight. • Test Battery: Have it tested if the car is slow to start or electrical components aren't working properly. |
| PSO6 | <p>Fluid Levels:</p> <ul style="list-style-type: none"> • Coolant: Check and top off as needed to prevent engine overheating. • Transmission Fluid: Check level and condition; it should be pink or red and clear. • Power Steering Fluid: Ensure it's at the recommended level for smooth steering. |
| PSO7 | <p>Filters:</p> <ul style="list-style-type: none"> • Air Filter: Replace every 12,000 to 15,000 miles or as needed. • Cabin Filter: Replace every 15,000 to 20,000 miles to ensure clean air inside the vehicle. |
| PSO8 | <p>Belts and Hoses:</p> <ul style="list-style-type: none"> • Inspection: Check for wear and tear. Replace belts that are frayed or cracked. |
| PSO9 | <p>Lights:</p> <ul style="list-style-type: none"> • Regular Checks: Ensure all lights are functioning correctly, including headlights, brake lights, and turn signals. |
| PSO10 | <p>• Engine Won't Start:</p> <ul style="list-style-type: none"> • Possible Causes: Dead battery, faulty starter, or fuel delivery issues. • Check: Battery charge and connections, starter motor, and fuel level. |
| PSO11 | <p>Strange Noises:</p> <ul style="list-style-type: none"> • Grinding or Squealing: May indicate brake issues. • Hissing: Could be a sign of a coolant leak or an issue with the exhaust system. |

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| <i>PSO12</i> | <ul style="list-style-type: none"> • Overheating: <ul style="list-style-type: none"> • Possible Causes: Low coolant, thermostat failure, or a failing water pump. • Check: Coolant levels, look for leaks, and ensure the radiator is functioning properly. |
| <i>PSO13</i> | <p>Poor Fuel Economy:</p> <ul style="list-style-type: none"> • Possible Causes: Dirty air filter, under-inflated tires, or fuel system issues. • Check: Air filter, tire pressure, and fuel system components. |
| <i>PSO14</i> | <p>Check Engine Light:</p> <ul style="list-style-type: none"> • Possible Causes: Various issues from minor to major. • Check: Use an OBD-II scanner to read the trouble codes and get more specific information. |
| <i>PSO15</i> | <ul style="list-style-type: none"> • Transmission Slipping: <ul style="list-style-type: none"> • Possible Causes: Low transmission fluid or worn-out components. • Check: Transmission fluid level and condition; seek professional help if needed. |
| <i>PSO16</i> | <p>Steering Issues:</p> <ul style="list-style-type: none"> • Possible Causes: Low power steering fluid or alignment issues. • Check: Fluid levels and steering responsiveness; get an alignment if necessary. |
| <i>PSO17</i> | <p>Battery Problems:</p> <ul style="list-style-type: none"> • Symptoms: Difficulty starting, dim lights. • Check: Battery charge and connections. If the battery is old, it might need replacement. |
| <i>PSO18</i> | <p>Engine Systems:Theory:</p> <ul style="list-style-type: none"> • Internal Combustion Engines: Understanding engine cycles (Otto, Diesel) and components like pistons, crankshaft, and camshaft. |

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| | <p>Application:</p> <ul style="list-style-type: none"> • Maintenance: Regularly change oil and filters, check for abnormal noises or vibrations. • Troubleshooting: Diagnose engine performance issues by analyzing symptoms like rough idling or power loss. Use diagnostic tools to read engine codes and perform compression tests. |
| <p><i>PSO19</i></p> | <p>Transmission Systems</p> <p>Theory:</p> <ul style="list-style-type: none"> • Manual and Automatic Transmissions: Learn about gear mechanisms, clutch systems, and torque converters. <p>Application:</p> <ul style="list-style-type: none"> • Maintenance: Regularly check and replace transmission fluid, inspect the clutch for wear. • Troubleshooting: Address issues like slipping gears or hard shifting by examining fluid levels, checking for leaks, and testing components. |
| <p><i>PSO20</i></p> | <p>HVAC Systems</p> <p>Theory:</p> <ul style="list-style-type: none"> • Heating, Ventilation, and Air Conditioning: Understand air conditioning compressors, evaporators, and climate control systems. <p>Application:</p> <ul style="list-style-type: none"> • Maintenance: Regularly check refrigerant levels and cabin air filters. • Troubleshooting: Address issues like poor cooling or heating by inspecting the AC compressor, checking for leaks, and evaluating the HVAC controls. |
| <p><i>PSO21</i></p> | <p>Diagnostic Tools and Techniques</p> <p>Theory:</p> <ul style="list-style-type: none"> • OBD-II Systems: Learn to use On-Board Diagnostics tools to interface with vehicle ECUs. |

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| | <p>Application:</p> <ul style="list-style-type: none">• Maintenance: Use diagnostic tools to perform regular system checks and clear trouble codes.• Troubleshooting: Identify and interpret trouble codes, perform targeted repairs based on diagnostic data. |
| <i>PSO22</i> | <p>Hands-On Projects:</p> <ul style="list-style-type: none">• Work on real vehicles, perform repairs and modifications, and gain experience with automotive tools and technologies. |

After completion of this course the students can learn:

| <i>Year</i> | <i>Paper Code</i> | <i>Paper Name</i> | <i>Course</i> | <i>Course Outcome</i> |
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| <i>1st Year</i> | <i>AUMB1.01</i> | <i>AUTOMOTIVE WORKSHOP SAFETY</i> | <i>CO1</i> | Workshop & Safety Precaution Abbreviation & Symbols used in Automobile Technology (3Hrs) Introduction with Automotive Workshop & its Equipments (4Hrs) Safety Precaution (3Hrs) |
| | <i>AUMB 1.02</i> | <i>Mechanical Instruments</i> | <i>CO2</i> | Equipments & Tools <ul style="list-style-type: none"> ➤ Basic Function of Workshop Equipments . ➤ Introduction with Tools Uses for automotive workshop Introduction with Special Tools Uses for automotive workshop . <ul style="list-style-type: none"> ➤ Basic orientation on shop –floor job <ul style="list-style-type: none"> ➤ Description, care & uses of different types of Micrometer . ➤ Description, care & uses of different types of Calipers & gauges . |
| | <i>AUMB1.03</i> | <i>ENGINE CONSTRUCTION</i> | <i>CO3</i> | Introduction to Automobiles Engines <ul style="list-style-type: none"> ➤ Automobiles Engines. ➤ Automobiles Engines Classification . Engine Construction <ul style="list-style-type: none"> ➤ Basic engine components . |

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| | | | | <ul style="list-style-type: none"> ➤ Cylinder Block , Gaskets & Oil Seals, Cylinder Head . ➤ Function of piston, piston rings, connecting rod, and piston pins, measurement and fitting of piston rings . ➤ Crankshaft, Camshaft and Rocker arm, Cam chain, Connecting Rod, Engine Bearing . ➤ Trouble shooting of low and high compression, excessive noise, poor idling . ➤ Valve & valve trains, trouble shooting of excess smoke, overheating, knocking, cam chain noise etc. |
| | <i>AUMB1.0 4</i> | <i>Measurement System (practical)</i> | <i>CO4</i> | <p>System of Measurement</p> <ul style="list-style-type: none"> ➤ Introduction with Special Tools Uses for automotive workshop . ➤ Basic orientation on shop –floor job . ➤ Description, care & uses of different types of Micrometer . ➤ Description, care & uses of different types of Calipers & gauges |
| | <i>AUMB 1.05</i> | <i>Automobile Repair and servicing (PRACTICAL)</i> | <i>CO5</i> | <p>PRACTICE -Function of piston, piston rings, connecting rod, and piston pins,</p> <ul style="list-style-type: none"> ➤ measurement and fitting of piston rings ➤ Crankshaft, Camshaft and Rocker arm, Cam chain, Connecting Rod, Engine Bearing . ➤ Trouble shooting of low and high compression, excessive noise, poor idling ➤ Valve & valve trains, trouble shooting of excess smoke, overheating, knocking, cam chain noise etc. |

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| | AUMB2.0 1 | <i>Engine Operating and Ignition System</i> | CO6 | <p>Engine Operating System Operating of Piston Reciprocating I C Engine</p> <ul style="list-style-type: none"> ➤ Single - Cylinder Engine, Multi - cylinder Engine, Arrangement of Cylinders, Firing Order Of Cylinder . ➤ Engine Compression System, Engine Performance (5Hrs) <p>Ignition System</p> <ul style="list-style-type: none"> ➤ S I Engine Fuel System ➤ C I Engine Fuel System ➤ Fuel Tank, Filtration Arrangement, & Fuel lines . ➤ Fuel Injection Pump . ➤ Air Cleaner Cum Filter, ➤ Fuel Gauge. ➤ Carburetor & Its Operation System. ➤ Carburetor construction . ➤ Carburetor Adjustment and Servicing . ➤ MPFI system with new EFI (ELECTRONIC FUEL IGNITION SYSTEM). |
| | AUMB2.0 2 | <i>Lubricating and Cooling System</i> | CO7 | <p>Lubricating system and its Function</p> <ul style="list-style-type: none"> ➤ Introduction & Purpose of Lubrication. ➤ Properties of Lubrication & Types of Lubricants . <p>Cooling System</p> <ul style="list-style-type: none"> ➤ Properties and Method of Cooling System . ➤ Air Cooling System and Water Cooling System . |
| | AUMB2.0 3 | <i>Function of Engine Operating , lubricating and cooling system</i> | CO8 | <ul style="list-style-type: none"> ➤ Parts of Lubricating System . ➤ Engine Lubricating System . ➤ 3 Components of Water Cooling. |

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| | | <i>.(Practical)</i> | | ➤ Liquid and Steam Cooling. |
| | AUMB2.0 4 | Ignition System (Practical) | CO9 | ➤ Practice on Vehicle Ignition System . |
| | AUMB2.0 5 | Industrial Training | C10 | ➤ Varieties Automobile Industries and Workshop visit and Internship . |

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| 2 nd year | AUMB3. 01 | Auto electrical with vehicle controlling system | CO1 | Electrical, Electronic System and charging system ➤ Basic Electrical & Electronic Principles and System. ➤ Car Batteries and Its construction . |
| | AUMB3. 02 | Under Chassis Controlling system | CO2 | Vehicle Chassis System ➤ The Chassis & its Operating Condition. ➤ Chassis Frame Section, Chassis Repairing. ➤ Chassis Paint Work, Antirust treatment . ➤ Dent Repairing, Cavity protection . ➤ The Chassis & its Operating Condition. ➤ Chassis Frame Section, Chassis Repairing . ➤ Chassis Paint Work, Antirust treatment Dent Repairing, Cavity protection. |
| | AUMB3. 03 | Steering removing from vehicle and dismantling. (practical) | CO3 | Vehicle Axle & Steering System ➤ Vehicle Axle, Front Axle, Rear Axle & Differential . ➤ Steering System ➤ Steering Components ➤ Power Steering. ➤ Four Wheel Steering . ➤ Steering Geometry. |
| | AUMB 3.04 | Transmission unit step by step remove and refit (Practical) | CO4 | Clutches and Transmission System ➤ Clutch and its application. ➤ Clutch construction, Types of Clutches |

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| | | | | <ul style="list-style-type: none"> ➤ Clutch Faults, Causes & Remedies ➤ Gear Operating System ➤ Types of Gear and its function ➤ Types of Gearbox and its operation, Lubrication and Maintenance ➤ Fluid coupling, Fluid Flywheel & Torque Converter . |
| | <i>AUMB 3.05</i> | <i>Braking System Dismanteling and Assembly(Practical)</i> | <i>CO5</i> | <p>Brakes System</p> <p>Requirement of Brake</p> <ul style="list-style-type: none"> ➤ Types of brakes and its components. ➤ Brakes operating system ➤ Anti lock Braking System |
| | <i>AUMB4. 01</i> | <i>Fuel fit system and emission control system .</i> | <i>CO6</i> | <p>Fuel Feed System</p> <ul style="list-style-type: none"> ➤ Different types of feed system in Petrol Engine ➤ Petrol Engine Fuel Injection System – MPFI System ➤ Diesel Engine Fuel Injection System ➤ Common Rail Direct Injection System - CRDI |
| | <i>AUMB4. 02</i> | <i>Customer Care and marketing and insurance</i> | <i>CO7</i> | <p>Customer Handling Management</p> <ul style="list-style-type: none"> ➤ Customer handling and customer satisfaction studies ➤ Customers delight studies Handling of irate customers <ul style="list-style-type: none"> ➤ Customer satisfaction measurement system in Industry <p>Marketing and Insurance</p> <ul style="list-style-type: none"> ➤ Product and feature demonstration ➤ Identification of Hot Spots, Need analysis ➤ Insurance and coverage of Insurance, Depreciation, etc. |

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| | <i>AUMB 4.03</i> | <i>Fuel Feed System Checking and Re assembly</i> | <i>CO8</i> | Fuel and Emission Control <ul style="list-style-type: none"> ➤ Classification of Fuel, origin, refining of petroleum ➤ Octen number, Cetane number, Knock Control, Engine Knocking ➤ Automobile Emission Control, Emission norms, BS I, BS II, BS III, BS IV, BS V |
| | <i>AUMB 4.04</i> | <i>Wheel Remove from vehicle and Dismanteling with Assembly</i> | <i>CO9</i> | Vehicle Wheels, Rims, Tyres <ul style="list-style-type: none"> ➤ Automobile Wheels and Rims Wheel Balancing ➤ Tyre Construction & Maintenance ➤ Tubeless Tyre advantage and repair |
| | <i>AUMB4. 05</i> | <i>Internship at industry workshop</i> | <i>CO10</i> | Internship at automobile workshop and industry |
| | <i>3rd year</i> | | | |
| | <i>AUMB 5.1</i> | <i>General Durability and Engine performance Test</i> | <i>CO1</i> | <ul style="list-style-type: none"> ➤ General Durability Testing, ➤ Performance Testi Specific Testing Equipment, ➤ Chassis Dynamometer |

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| | AUMB 5.2 | Emission and Efficiency Control | CO2 | <ul style="list-style-type: none"> ➤ Specific Testing and Validation, Emissions fuel efficiency |
| | AUMB 5.3 | Compression & Ignition test for petrol and diesel engine (Practical) | CO3 | <ul style="list-style-type: none"> ➤ Crankshaft, Camshaft and Rocker arm, Cam chain, Connecting Rod, Engine Bearing ➤ Trouble shooting of low and high compression, excessive noise, poor idling |
| | AUMB 5.4 | Spark plug test, Brake Test by Dynamometer (prac tical) | CO4 | <ul style="list-style-type: none"> ➤ Specific Testing Equipment ➤ , Chassis Dynamometer Brake Testing Dynode |
| | AUMB 5.5 | Emission Test (practical) | CO5 | <ul style="list-style-type: none"> ➤ Practical practice of Emission control norms |
| | AUMB.6. 1 | Auto Electrical and Electronics circuit system | CO6 | <ul style="list-style-type: none"> ➤ Auto Electricals & Electronics EMS system of car ➤ Vehicle electrical wiring system |
| | AUMB 6.2 | Diagnosis System and New Technology on Car | CO7 | <ul style="list-style-type: none"> ➤ Diagnostics and Safety Systems ➤ Diagnosis software on CAR ➤ Study of new feature and |

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| | | | | technology on Car |
| | AUMB6. 3 | <i>Starting and Ignition System Fault Diagnosis And remedies of vehicle (practical)</i> | CO8 | <ul style="list-style-type: none"> ➤ Ignition System, Electronic Ignition System practice |
| | AUMB 6.4 | <i>Charging System troubleshooting and their remedies (practical)</i> | CO9 | <ul style="list-style-type: none"> ➤ Auto Electrical System, Dynamo, Alternator, ➤ Principles operation of Charging System and Its Requirements, Charging Voltage |
| | AUMB5. 5 | <i>Auto Electric and electronics wiring fault diagnosis and their remedies(practical)</i> | CO10 | <ul style="list-style-type: none"> ➤ Vehicle Wiring Circuits ➤ Diagnosis software on CAR ➤ Study of new feature and technology on Car |