



7. TRADE SYLLABUS

SYLLABUS – MECHANIC AUTO ELECTRICAL & ELECTRONICS			
Duration: One Year			
Duration	Reference Learning Outcome	Professional Skills (Trade Practical) With Indicative Hours	Professional Knowledge (Trade Theory)
Professional Skill 112Hrs; Professional Knowledge 25Hrs	Use different types of tools and work shop equipment in the Auto work shop following safety precautions. (NOS: ASC/N1406)	<ol style="list-style-type: none"> 1. Familiarization with institute, Job opportunities in the automobile sector, Machinery used in Trade. (10 hrs) 2. Types of work done by the students in the shop floor. (15 hrs) 3. Practical related to Safety and Health, Importance of maintenance and cleanliness of Workshop. (08 hrs) 4. Interaction with health centre and fire service station to provide demo on First aid and Fire safety, Use of fire extinguishers. (07 hrs) 5. Demonstration on safe handling and Periodic testing of lifting equipment, and Safety disposal of used engine oil. (08 hrs) 6. Energy saving Tips of ITI electricity Usage. (02 hrs) 7. Practice using all marking aids, like steel rule with spring calipers, dividers, scriber, punches, Chisel 	Admission & introduction to the trade: Introduction to the Course duration, course content, study of the syllabus. General rule pertaining to the Institute, facilities available-Hostel, Recreation, Medical and Library working hours and time table. (07hrs) Occupational Safety & Health Importance of Safety and general Precautions to be observed in the shop. Basic first aid, safety signs - for Danger, Warning, caution & personal safety message. Safe handling of Fuel Spillage, Fire extinguishers used for different types of fire. Safe disposal of toxic dust, safe handling and Periodic testing of lifting equipment, Authorization of Moving & road testing vehicles. Energy conservation-Definition, Energy Conservation Opportunities (ECOs)-Minor ECOs and Medium ECOs,



		<p>etc., Layout a work piece- forline, circle, arcs and circles.(40hrs)</p> <p>8. Practice on removing and refitting of Dash Board. Front, Rear bumpers and other electrical components (22 Hrs)</p>	<p>MajorECOs), Safety disposal of Used engine oil, Electrical safety tips. (07hrs)</p> <p>Hand & Power Tools:- Marking scheme, Marking material-chalk, Prussian blue.Cleaning tools- Scraper, wire brush, Emery paper, Description, care and use of Surface plates, steel rule, measuring tape, try square. Calipers-inside and outside. Dividers, surface gauges, scribe, punches-prick punch,center punch, pin punch,hollow punch, number and letter punch. Chisel-flat, cross- cut. Hammer- ball pein, lump, mallet. Screw drivers-blade screwdriver, Phillips screw driver, Ratchet screwdriver. Allen key, bench vice & C-clamps, Spanners- ring spanner, open end spanner & the combination spanner, universal adjustable open endspanner. Sockets & accessories,Pliers - Combination pliers, multi grip, long nose, flat-nose (11hrs)</p>
<p>Professional Skill 28 Hrs; Professional Knowledge 04 Hrs</p>	<p>Perform precision measurements on the components and compare parameters with</p>	<p>9. Practice on measuring the given component using precision measuring equipment like Vernier caliper, Micrometer (28</p>	<p>Systems of measurement, Description, care & use of - Micrometers- Outside and depth micrometer, Micrometeradjustments,</p>

	specifications used in automotive work shop practices. (NOS: ASC/N1406)	Hrs)	Vernier calipers, Dial indicators,, thread pitch gauge, (04hrs)
Professional Skill 56 Hrs; Professional Knowledge 10 Hrs	Use different types of tools and work shop equipment in the Auto work shop following safety precautions. (NOS: ASC/N1406) Use of different type of fastening and locking devices in a vehicle. (NOS: ASC/N9416)	10. Practice on General cleaning, checking and use of nut, bolts, & studs etc.(16 hrs) 11. Removal of stud/bolt from blind hole. (06 hrs) 12. Practice on cutting tools like Hacksaw, file, chisel, Sharpening of Chisels, center punch, safety precautions while grinding. (20 hrs) 13. Practice on Hacksawing and filing to given dimensions. (14 hrs)	Fasteners- Study of different types of screws, nuts, studs & bolts, locking devices, Such as lock nuts, cotter, split pins, keys, circlips, lock rings, lock washers and locating where they are used. Washers & chemical compounds can be used to help secure these fasteners. Oil seals. Cutting tools. Study of different type of cutting tools like Hacksaw, File- Definition, parts of a file, specification, Grade, shape, different type of cut and uses., OFF-hand grinding with sander, bench and pedestal grinders, safety precautions while grinding. Limits, Fits & Tolerances:- Definition of limits, fits & tolerances with examples used in auto components. (10 hrs)
Professional Skill 56 Hrs; Professional Knowledge 12 Hrs	Perform basic fitting operations used in the work shop practices and inspection of dimensions. (NOS: ASC/N9417)	14. Practice on Marking and Drilling clear and Blind Holes, Sharpening of Twist Drills Safety precautions to be observed while using a drilling machine.(18 hrs) 15. Practice on Tapping a Clear and Blind Hole, Selection of tap drill Size, use of	Drilling machine - Description and study of Bench type Drilling machine, Portable electrical Drilling machine, drill holding devices, Work Holding devices, Drill bits. Taps and Dies: Hand Taps and wrenches, Calculation of Tap drill sizes for metric and inch taps. Different type of Die and

		<p>Lubrication, Use of stud extractor. (16 hrs)</p> <p>16. Cutting Threads on a Bolt/ Stud. (10 hrs)</p> <p>17. Adjustment of two piece Die, Reaming a hole/ Bush to suit the given pin/ shaft, scraping a given machined surface. (12 hrs)</p>	<p>Die stock. Screw extractors. Hand Reamers - Different Type of hand reamers, Drill size forreaming, Lapping, Lapping abrasives, type of Laps. (12 hrs)</p>
<p>Professional Skill 28 Hrs;</p> <p>Professional Knowledge 07 Hrs</p>	<p>Construct electrical circuits and test its parameters by using electrical measuring instruments.</p> <p>(NOS: ASC/N1406)</p>	<p>18. Practice in joining wires using soldering Iron, Construction of simple electrical circuits.(16hrs)</p> <p>19. Measuring of current, voltage and resistance using digital multimeter, practice continuity test for fuses, jumper wires, fusible links, circuit breakers.(12 hrs)</p>	<p>Basic electricity, Ground connections, Voltmeter, ammeter, Ohmmeter, Multimeter, Conductors & insulators, Wires, Shielding, Length vs. resistance, Resistor ratings. (07 hrs)</p>
<p>Professional Skill 28 Hrs;</p> <p>Professional Knowledge 05 Hrs</p>	<p>Perform basic electrical testing in a vehicle.</p> <p>(NOS: ASC/N1406)</p>	<p>20. Diagnose series, parallel, series-parallel circuits using Ohm's law, Check electrical circuit with a test lamp, perform voltage drop test in circuits using multimeter, measure current flow using multimeter /ammeter, use of service manual wiring diagram for troubleshooting. (28 hrs)</p>	<p>Fuses & circuit breakers, Ballast resistor, Stripping wire insulation, cable colour codes and sizes, Resistors in Series circuits, Parallel circuits and Series-parallel circuits, Capacitors and its applications, Capacitors in series and parallel.(05 hrs)</p>
<p>Professional Skill 28 Hrs;</p> <p>Professional Knowledge 04 Hrs</p>	<p>Perform battery testing and charging operations.</p>	<p>21. Cleaning and topping up of a lead acid battery, testing battery with hydrometer. (08 hrs)</p> <p>22. Connecting battery to a charger for battery charging, Inspecting &</p>	<p>Batteries & cells, Lead acid batteries & Stay Maintenance Free (SMF) batteries, Thermistors, Thermo couples, Relays, Solenoids, Charging system circuit (04 hrs)</p>

	(NOS: ASC/N1406)	<p>testing a battery after charging.(08 hrs)</p> <p>23. Measure and Diagnose the cause(s) of excessive Key-offbattery drain (parasitic draw) and do corrective action. (07 hrs)</p> <p>24. Testing of relay and solenoids and its circuit. (05 hrs)</p>	
<p>Professional Skill 28 Hrs;</p> <p>Professional Knowledge 07 Hrs</p>	<p>Construct basic electronic circuits and testing.</p> <p>(NOS: ASC/N9418)</p>	<p>25. Identify and test power and signal connectors for continuity, Identify and test different type of Diodes, NPN & PNP Transistors for its functionality.(16 hrs)</p> <p>26. Construct and test simple logic circuits OR, AND & NOTand Logic gates using switches. (12 hrs)</p>	<p>Basic electronics: Description ofSemi-conductors, Solid statedevices- Diodes, Transistors,Thyristors, Uni-JunctionTransistors (UJT), Metal Oxide Field Effect Transistors (MOSFETs), Logic gates-OR, AND& NOT and Logic gates using switches. (07 hrs)</p>
<p>Professional Skill 28Hrs;</p> <p>Professional Knowledge 04 Hrs</p>	<p>Check & Interpret Vehicle Specification data and VIN. Select & operate various Service Station Equipment's.</p> <p>(NOS: ASC/N1406)</p>	<p>27. Identification of different type of Vehicle. (04 hrs)</p> <p>28. Demonstration of vehicle specification data.(06 hrs)</p> <p>29. Identification of vehicle information Number (VIN). (04 hrs)</p> <p>30. Demonstration of Garage, Service station equipments. (07 hrs)</p> <p>31. Vehicle hoists - Two post and four post hoist, Engine hoists, Jacks, Stands.(07 hrs)</p>	<p>Auto Industry - History, leading manufacturers, development inautomobile industry, trends, new product. Brief about Ministry of Road transport & Highways, Definition: - Classification of vehicles on the basis of load as per central motor vehicle rule, wheels, final drive, and fuel used, axles,position of engine and steering transmission, body and load. Brief description and uses of Vehicle hoists -Two post and four post hoist, Engine hoists, Jacks, Stands. (04 hrs)</p>

<p>Professional Skill 28Hrs; Professional Knowledge 07 Hrs</p>	<p>Identify the major components of LMV/HMV and dashboard gauges. (NOS: ASC/N1406)</p>	<p>32. Identification of parts in a diesel/petrol engine of LMV/HMV.(08 hrs) 33. Practice on starting and stopping of diesel/petrol engines. (12 hrs) 34. Observe and report the reading of Tachometer, Odometer, temp and Fuel gauge under ideal and on load condition. (08 hrs)</p>	<p>Introduction to Engine: Principle & working of 4-stroke diesel engine (Compression ignition Engine (C.I), Principle of Spark Ignition Engine (SI), difference between C.I. engine and S.I Engine, Technical terms used in engine, Engine specification. Study of various gauges/instrument on a dash board of a vehicle- Speedometer, Tachometer, Odometer and Fuel gauge, and Indicators such as gear shift position, Seat belt warning light, Parking-brake-engagement warning light and an Engine-malfunction light. Different type of starting and Stopping method of Petrol/Diesel Engine. (07 hrs)</p>
<p>Professional Skill 28Hrs; Professional Knowledge 07 Hrs</p>	<p>Identify and Check wiring circuits and the electrical components in the vehicle. (NOS: ASC/N1406)</p>	<p>35. Practice to identify components and their locations indicated on the wiring diagram. (12 hrs) 36. Practice to identify the power source, ground connection, and controls for electrical circuits using a wiring diagram. (16 hrs)</p>	<p>Electrical and Electronic Components:- Switches- Description of Normally open, Normally closed, single pole single throw switch (SPST), ganged, and mercury switches used in Automobile circuit. Description of Relay, ISO Relays, Solenoids, Buzzers. Resistors- Description of different type of resistors and their color codes - Fixed, stepped, and variable resistors- Rheostat, Potentiometer.</p>

			<p>Description of Diodes, Diode identification and ratings, zener diodes, Avalanche diodes, Light emitting diodes, photo diodes and clamping diodes.</p> <p>Transistors- Description of NPN, PNP, field-effect transistor (FET), phototransistors.</p> <p>Description of Integrated circuits. Circuit protection devices- Description of fuses, different type of fuses- glass or ceramic, blade and bullet or cartridge fuses. Fusible links, maxi fuses, circuit breaker, Positive Temperature coefficient (PTC) resistor device. (07 hrs)</p>
<p>Professional Skill 28Hrs; Professional Knowledge 05 Hrs</p>	<p>Trace /troubleshoot different wiring circuits in vehicle and preparedifferent electrical joints.</p> <p>(NOS: ASC/N1406)</p>	<p>36. Diagnosis and remedy for- Speedometer shows no operation, fuel level meter shows no operation, coolanttemp meter shows nooperation, Oil pressure light shows no lighting. (28 hrs)</p>	<p>Wiring and circuit diagrams- Automotive wiring.</p> <p>Comparisonbetween solid and strandedprimary wire.</p> <p>Description of wire size- Metric and American wire gauge (AWG), Importance of groundstraps used in automotive wiring.</p> <p>Description of different type of terminals and connectors- Molded, multiple-wire hard shell, bulkhead, weather-pack,metri-pack, heat-shrinkcovered butt connectors.</p> <p>Importance of printed circuit boards, wiring harnesses, wiring diagrams and color codes and circuit numbering.</p> <p>Study of common electrical</p>

			and electronic symbols used in wiring diagrams. (05 hrs)
Professional Skill 28 Hrs; Professional Knowledge 04 Hrs	Check and overhaul the ignition system. (NOS: ASC/N1406)	37. Check and replace ignition coil, Check ignition timing, Checking & changing a sparkplug (04 hrs) 38. Diagnosis- Possible causes and remedy for Engine cranks, but will not or hard to start, Poor fuel economy or engine performance.(06 hrs) 39. Identification and testing of Hall effect sensor, Optical sensor. (08 hrs) 40. Tracing and testing of sensor circuits.(05 hrs) 41. Tracing of Distributor less ignition systems circuit. (05 hrs)	Ignition principles and Primary and secondary winding of Ignition components, Spark plugs, Spark plug components, ballast resistor coil, Dwell angle, Spark timing. Battery power source, Description and function of Capacitor/condenser, High-tension leads, Induction wiring, Hall effect sensors, Hall effect operation, Optical type sensors Distributorless ignition systems, Insulated coils, Distributor less ignition system timing. (04 hrs)
Professional Skill 56Hrs; Professional Knowledge 10Hrs	Apply appropriate rule and tools for starting and Charging system and diagnose & rectify faults. (NOS: ASC/N1406)	42. Removing starter motor from vehicle, and Performance test for pull-in test, Hold-in test, pinion (plunger) return test, No-load performance test. (08 hrs) 43. Solenoid test for Hold in coil open circuit, Armature test - Ground test, Open circuit test, pull-in coil open circuit test, field coil test. (04hrs) 44. Inspections of brush length wear as per service manual. (02 hrs) 45. Trouble shooting, possible causes and	Starting system- purpose of starting system, Starting system components, Starter motor principles, study of starter control circuits. Starter motor construction, Starter magnet types, Starter motor engagement, Commutation, Switching, solenoid construction. (05 hrs)

		<p>remedy for starter motor not running, Starting motor running but too slow (small torque), starting motor running, but not cranking engine. Noise, starting motor does not stop running. Growler testing for rotors. (08hrs)</p> <p>46. Checking a starting system, Jump-starting a vehicle. (06 hrs)</p>	
		<p>47. Checking a charging system for the Cause of undercharge, No charge, and over charge conditions. (04 hrs)</p> <p>48. Removing & replacing an alternator, Inspection of rotor for ground, open circuit - field coil resistance, slip ring surface, Fan, bearing. (06 hrs)</p> <p>49. Inspection of stator for ground, open circuit, Inspection of Drive end bearing rotation, Rectifier, brush length compare with service manual. (06 hrs)</p> <p>50. Slip ring surface. Inspecting & adjusting an engine drive belt, replacing an engine drive belt / pulleys / Tensioners and their alignments. (06 hrs)</p> <p>51. Trouble shooting, possible causes and remedy for warning lamp does not</p>	<p>Charging system- The purpose of Charging system, charging system components, charging system circuit, Alternator principles, Alternating current, Alternator components, Rectification, Phase winding connections, Rotor circuit, Voltage regulation, System operating voltage, High voltage charging systems, Rotor, Stator, Alternator end frames, Slip ring & brush assembly, Rectifier assembly, Alternator cooling fan. (05 hrs)</p>

		<p>glow when ignition switch is on, Warning lamp glows dim when ignition switch is on, warning lamp 'on' while the alternator is running, Warning lamp glows 'dim' while the alternator is running, warning lamp flickers considerably. (06 hrs)</p>	
<p>Professional Skill 84 Hrs; Professional Knowledge 12 Hrs</p>	<p>Understand the constructional features and working principles of EDC/MPFI system. (NOS: ASC/N9419)</p>	<p>52. Identification of EDC components, sensors, testing of sensors and actuators. (14 hrs) 53. Identification of various components of MPFI system.(06hrs) 54. Testing of MPFI components and replacement if necessary. (04 hrs) 55. Check delivery from fuel Pump. Replacing a fuel filter. (02 hrs) 56. Identification of Electronic control Unit. (07hrs) 57. Set up for testing, Testing of Electronic Control Circuit. (08 hrs) 58. Fault finding in Electronic circuit and remedies using scan tool. (18hrs) 59. Identification of various sensors installed in engine & its mounting. (10 hrs) 60. Testing of Temperature sensor, Pressure sensor, potentiometer, magnetic</p>	<p>Electronic Diesel control- Electronic Diesel control systems, Common Rail Diesel Injection (CRDI) system, Hydraulically actuated electronically controlled unit injector (HEUI) diesel injection system. Sensors, actuators and ECU (Electronic Control Unit) used in Diesel Engines. Introduction to Electronic fuel injection (EFI) fuel supply system, Multi-point injection systems (MPI/MPFI), EFI air cleaners, Electronic mufflers, EFI fuel supply system components- Description of Fuel pumps, EFI sensors, Potentiometer, Auxiliary air valves, Idle speed control devices, Inertia sensors. Introduction to EFI Engine Management - EFI operation Modes of EFI, Idle speed control systems, Feedback & looping, Cold start systems, Air measurement, Air-flow monitoring, Variable intake</p>



		induction sensor, cam shaft sensor, crankshaft position sensor. (15 hrs)	manifold system, Electrical functions, EFI wiring diagram, Electronic control unit - ECU, EFI system ECU, Electronic control unit settings, Engine speed limiting, Malfunction indicator lamp. Importance of Diagnostic Trouble Code (DTC) & its general format. Use of scan tool and retrievals of codes. (07hrs) EFI sensors- Description, location and function of Intake Temperature sensor, Mass airflow sensor, Manifold absolute pressure sensor, Air vortex sensor, Fuel system sensor, Throttle position sensor, Exhaust gas oxygen sensor, Crank angle sensor, Hall effect voltage sensor. (05 hrs)
Professional Skill 28 Hrs; Professional Knowledge 07 Hrs	Inspect power Steering control module and troubleshooting power steering. (NOS: ASC/N1406)	61. Inspection of power steering control module circuit. (04 hrs) 62. Trouble shooting and remedy for steering wheel feels heavy at low speed, poor recovery from turns, Vehicle pulls to one side during straight driving. (06 hrs) 63. Identification of ABS components, checking of ABS warning lamp. (04 hrs) 64. Identification of Automatic transmission components. (04 hrs)	Steering, suspension and Brakes:- Description of Electric power assisted steering and its wiring circuit. Basic electric power steering operation, Electronic adjustable-rate shock absorbers, Electric brakes, Electro hydraulic braking (EHB), ABS brake system, Antilock braking system operation, Principles of ABS braking,

		65. Inspection of shift lever switch, throttle position sensor, speed sensor and automatic transmission wiring harness coupler.(10 hrs)	ABS master cylinder, Hydraulic control unit, Wheel speed sensors, ABS with Electronic Brake force Distribution (EBD) control unit. Electronic control transmission- Electronic control Unit, Fully hydraulically controlled transmission, Electronic shift programs, Manual selection. (07 hrs)
Professional Skill 56 Hrs; Professional Knowledge 10 Hrs	Diagnosis for all comfort system. (NOS: ASC/N1406)	66. Identification of Air conditioning components, Performance test on A/c unit, Checking Charged state of refrigerant, Inspecting & adjusting an engine drive belt, replacing an engine drive belt. 67. Checking a heating system, Compressor rotation test, air Gap check, Refrigerant recovery -evacuating - charging of A/c system. 68. Replenishing compressor oil level Trouble diagnose and remedy for No cooling or warm air, Cool air comes out only intermittently, cool air comes out only at high, Insufficient cooling, Abnormal noise from compressor Magnetic clutch, condenser, evaporator, blower motor. 69. Diagnosis test for high	Heating Ventilation Air Conditioning (HVAC) legislation, Vehicle heating, ventilation & cooling systems, Basic air-conditioning principles, Air-conditioning capacity, Air-conditioning refrigerant, Humidity, Description and function of Fixed orifice, Control devices, Thermostatic expansion valve system, Thermal expansion valves, Air-conditioning compressors, Condensers & evaporators, Receiver drier, Lines & hoses, TX valve construction, Temperature monitoring thermostat, Refrigerants, Pressure switches, Heating elements. Air-conditioning ECU, Ambient air temperature sensor, Servomotors, Electric servo motors, Automatic

		pressure gauge pressure high low, pressure gauge for pressure high low.(56 hrs)	climate controlsensors, Evaporator temperature sensor, Blowers speed control, Ventilationsystems. (10 hrs)
Professional Skill 56 Hrs; Professional Knowledge 10 Hrs	Demonstrate the skill of automotive lighting system and their troubleshooting. (NOS: ASC/N1406)	<p>70. Trace the light circuit - test bulbs, align head lamps, aiming headlights. (02 hrs)</p> <p>71. Changing a headlight bulb, checking of a head light switch and to replace if faulty. (02 hrs)</p> <p>72. Trouble shooting and remedy for Headlight - headlight do not light up, only one headlight does not light up, Only one beam ("Hi" or "Lo") does not light.(04 hrs)</p> <p>73. Trouble shooting and remedy for turn signal and hazard warning lights -Flash rate high or one side only flashes, No Flashing, flash rate low.(04 hrs)</p> <p>74. Trouble shooting and remedy for clearance, tail and license plate lights -All lights do not light up, some lights do not light up.(02hrs)</p> <p>75. Trouble shooting and remedy for Back-up light - Back-up lights do not light up. (03 hrs)</p> <p>76. Trouble shooting and remedy for Brake lights - Brake lights do not light up, Brake light stay on.(03 hrs)</p>	Discharge (HID) headlights. Headlight & dimmer circuits, Park & tail light circuits, Brake light circuits, turn signal circuit, Cornering lights, Fog lightscircuit, interior lights-courtesy, reading and instrument panel lights, Smart lighting , Reverse lights. (10 hrs)

		<p>77. Trouble shooting and remedy for fuel meter and fuel gauge unit - Fuel meter shows no operation or incorrect operation. (03hrs)</p> <p>78. Trouble shooting and remedy for Engine coolant Temp (ECT) meter and ECT Sensor - Engine coolant temp meter shows no operation or incorrect operation.(04 hrs)</p> <p>79. Lighting system, Lamps/lightbulbs, Lamp/light bulb information, LED lighting, Headlights-description of standard sealed beam, halogen sealed beam, composite and high intensity discharge (HID) headlights. (08 hrs)</p> <p>80. Headlight & dimmer circuits, Park & tail light circuits, Brake light circuits, turnsignal circuit, Cornering lights, Fog lights circuit, interior lights- courtesy, reading and Trouble shooting and remedy for oil pressure light - Oil pressure warning light does not light up when ignition switch is on at engine off.(08 hrs)</p> <p>81. Trouble shooting and remedy for brake and parking brake warning light- Brake warning light does</p>	
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		<p>notlight up when fluid flow level, Brake warning light does not light up when parking brake pull up, Brake warning lights stay on.(09 hrs)</p> <p>82. Trouble shooting and remedy for interior light- Interior light do not light up.(02hrs)</p> <p>83. Trace the wiring circuit of traffic signal flashers light circuit-tracing defects in the flasher circuits, replacing fuse bulb.(02hrs)</p>	
<p>Professional Skill 56 Hrs;</p> <p>Professional Knowledge 10 Hrs</p>	<p>Trouble shoots in all electrical circuits.</p> <p>(NOS: ASC/N1406)</p>	<p>84. Trouble shooting and remedy for Horn- No horn operation, poor sound quality, horn sounds continuously and to replace the horn if faulty.(12 hrs)</p> <p>85. Remove and install wiper motors and wiper switches.(08 hrs)</p> <p>86. Checking & replacing wiper blades.(08 hrs)</p> <p>87. Trouble shooting and remedy for windshield wiperand washer - no operation, intermittent operation,continuous operation, andwipers will not park. (08 hrs)</p> <p>88. Diagnose causes for improper operation of the windshield washer system and to replace the pump if faulty. (10 hrs)</p>	<p>Accessories: Horn circuit, wiper circuit, power window components and circuit. Power door lock circuit, automatic door lock circuit, remote keyless entry system circuit, antitheft system, immobilizer system. Navigation system, Car radio and cassette player, car videos.</p> <p>Description and function of Airbags, Seatbelt, Vehicle safety systems, Crash sensors, Seat belt pre-tensioners, Tire pressure monitoring systems Integrated communications, Proximity sensors, Reflective displays, Global positioning satellites, Triangulation/ trilateration, Telematics. Application of Automotive bus system-</p>

		89. Diagnose the power windows system for - all power window motors do not operate, some switches do not operate. (10 hrs)	currently used in cars: CAN (Control Area Network) , LIN (Local Interconnect Network), Flex Ray™ and MOST (Media Oriented Systems Transport), Importance of E/E Architecture. (10 hrs)
Engineering Drawing: 40 Hrs.			
Professional Knowledge ED- 40 Hrs.	Read and apply engineering drawing for different application in the field of work. (NOS: ASC/N9420)	<p><u>ENGINEERING DRAWING:</u> Introduction to Engineering Drawing and Drawing Instruments – Conventions Sizes and layout of drawing sheets Title Block, its position and content Drawing Instrument Lines- Types and applications in drawing Free hand drawing of – Geometrical figures and blocks with dimension Transferring measurement from the given object to the free hand sketches. Free hand drawing of hand tools and measuring tools. Drawing of Geometrical figures: Angle, Triangle, Circle, Rectangle, Square, Parallelogram. Lettering & Numbering – Single Stroke. Dimensioning Types of arrowhead Leader line with text Position of dimensioning (Unidirectional, Aligned) Symbolic representation – Different symbols used in the related trades of Mechanic Auto Body Repair / Electrical and Electronics / Diesel / Tractor / Two and Three-wheeler. Concept and reading of Drawing in Concept of axes plane and quadrant Concept of Orthographic and Isometric projections Method of first angle and third angle projections (definition and difference) Reading of Job drawing related to Mechanic Auto Body Repair / Electrical and Electronics / Diesel / Tractor / Two and Three-wheeler trades.</p>	
Workshop Calculation & Science: 40 hrs.			
Professional Knowledge	Demonstrate basic mathematical	<u>WORKSHOP CALCULATION & SCIENCE:</u> Unit, Fractions	

<p>WCS- 40 Hrs.</p>	<p>concept and principles to perform practical operations. Understand and explain basic science in the field of study. (NOS: ASC/N9421)</p>	<p>Classification of unit system Fundamental and Derived units F.P.S, C.G.S, M.K.S and SI units Measurement units and conversion Factors, HCF, LCM and problems Fractions - Addition, subtraction, multiplication & division Decimal fractions - Addition, subtraction, multiplication & division Solving problems by using calculator Square root, Ratio and Proportions, Percentage Square and square root Simple problems using calculator Applications of pythagoras theorem and related problems Ratio and proportion Ratio and proportion - Direct and indirect proportions Percentage Percentage - Changing percentage to decimal and fraction Material Science Types metals, types of ferrous and non-ferrous metals Physical and mechanical properties of metals Properties and uses of rubber, and insulating materials Mass, Weight, Volume and Density Mass, volume, density, weight and specific gravity. Related problems for mass, volume, density, weight and specific gravity Speed and Velocity, Work, Power and Energy Speed and velocity - Rest, motion, speed, velocity, difference between speed and velocity, acceleration and retardation Speed and velocity - Related problems on speed & velocity Work, power, energy, HP, IHP, BHP and efficiency Basic Electricity Introduction and uses of electricity, molecule, atom, how electricity is produced, electric current AC,DC their comparison, voltage, resistance and their units Conductor, insulator, types of connections - series and parallel Ohm's law, relation between V.I.R & related problems Electrical power, energy and their units, calculation with assignments Magnetic induction, self and mutual inductance and EMF generation Electrical power, HP, energy and units of electrical energy Mensuration Area and perimeter of square, rectangle and parallelogram Area and perimeter of Triangles</p>
<p>In plant Training/Project Work</p>		