Curriculum for
Automobile Mechanic
(1 Year)

Contents

Overall Objectives of the Course

(i) The learner will be able to work as a semi skilled worker.
(ii) Fulfill the job requirements for an employer.
(iii) Facilitate new entrants to learn and enter the labor market.
(iv) Improve the workmanship of existing workers.

Competencies Gained after Completion of Course

- To apply safety precautions.
- Select use and handle auto motive, hand tools, workshop tools, safely and efficiently.
- Identify and use automotive fasteners.
- Tune up the car.
- Diagnose and service the engine.
- Diagnose and service of fuel (Petrol, Diesel, E.F.I., and C.N.G.), lubricating, cooling, ignition, emission and exhaust systems.
- Diagnose and service the power train components as clutch, transmission, drive shaft, differential and axles.
- Diagnose and service the suspension, steering and brake systems.
- Replace battery, self starter and alternator.
- Do minor repair work of car wiring such as replacing fuses, bulbs and horns etc.
- Recheck the work done.

Job Opportunities Available Immediately and in the Future

- Pass out may be employed in following sectors.
- Car Workshops
- Car Dealerships
- Heavy Duty Workshops
- Private fleets and garages
- Government departments
- Assembly plants
- Generator workshops
- Spare parts stores.
- Self Business.

Learners can also progress to get admission in a 2 year course aimed at producing skilled workers i.e. Head Technician and Forman.

Entry Level

(i) Minimum Middle
(ii) Preferably Matric

Grading

Theory:	Pass marks	40%
Practical:	Pass marks	60%
	Fail	0 – 59%
	Average	60 – 78%
	Good	79 – 92%
	V. Good	93 – 100%

Overview about the program – Curriculum for Automobile Mechanic

Module Title and Aim	Learning Units	Theory hours	Workplace hours
Module 1: Automotive Workshop Basics Aim: Behave as a good automotive technician, use the tools, fasteners safely and efficiently.	Apply: 1.1 Safety Precautions 1.2 Measuring tools 1.3 Fasteners, sealants and cleaning liquids. 1.4 Automotive hand tools 1.5 Workshop tools 1.6 Behave safely in workshop	22	72
Module 2: Diagnosing and Servicing the Engine Aim: Perform maintenance, diagnosis and service work on engine efficiently.	Service the: 2.1 Engine 2.2 Fuel Systems 2.3 Lubrication Systems 2.4 Cooling Systems 2.5 Ignition Systems 2.6 Exhaust Systems.	115	602
Module 3: Service of Power Trains Aim: Diagnose and service the power train components amicably.	Service the: 3.1 Clutch Systems 3.2 Transmission and Transaxles 3.3 Propeller Shaft. 3.4 Differentials 3.5 Axles	40	204
Module 4: Servicing Chassis Systems	Service the: 4.1 Suspension Systems	69	272

Aim: Diagnose and repair the chassis systems efficiently.	4.2 Steering Systems 4.3 Brake Systems		
Module 5: Basic Electrical Systems Aim: Perform basic electrical tasks required for an engine technician	Maintenance and service of the: 5.1 Battery 5.2 Self Starter 5.3 Charging Systems 5.4 Electrical Components	20	70
Module 6: Application of Related Studies Aim: 1. Apply simple mathematical rules important in the workshop 2. Explain construction and function of components of various automotive systems	6.1 Solve mathematical problems 6.2 Sketch out technical drawing(Basic / related.	54	60
TOTAL HOURS		**320**	**1280**

Auto Mechanic Curriculum Contents (Teaching and Learning Guide)

Module 1 Title: Automotive Workshop Basics
Objective of the Module: Behave as a good automotive technician, use the tools, fasteners safely and efficiently.
Duration: 94 hours **Theory:** 22 hours **Practice:** 72 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials/ Tools Required	Learning Place
1.1 Apply the safety precautions	To adopt safety measures, personally, for the tools, job and environment	- Describe personal safety Tools and machine safety - Job safety - Environment safety - Demonstrate proper use of the fire extinguishers	6 Hrs	• Fire extinguishers • Vehicle	Class room and Institute workshop
1.2 Measuring	To measure precisely and to compare with standard size	Explain: - Measure units of mass, volume, length and time in Imperial/Metric System - Measure units in metric system - Identify and use with: • Steel rules • Vernier Caliper • Micrometer • Dial Gauge	20 Hrs	• Steel foot rule • Vernier Caliper • Micrometer • Dial Gauge • V – Blocks • Required Tools	Measuring Lab
1.3 Use of Fasteners and Sealants.	To identify and use fasteners and sealants	- Define fastener and its types - Identify auto motive fasteners and locking devices - Use of Circlips - Select and use of sealants - Explain purpose and materials of Gaskets - Identify Gaskets and “O” rings - Removing of broken studs/bolts	14 Hrs	• Various Types of Fasteners • Torque Wrench • Gaskets • Sealants	Class room and Institute workshop
1.4 Use of Hand Tools	Select use and handle the hand tools properly	- Identify and use fitting tools ➢ Screw Drivers ➢ Spanners ➢ Socket Set ➢ Allen Key ➢ Adjustable Wrench	39 Hrs	• General Mechanic Tool Kit	Institute workshop

		➢ Torque Wrench - Identify and use striking tools ➢ Hammers ➢ Punches - Identify and use pliers - Identify and use pullers ➢ Removing and refitting of bearings - Identify and use cutting tools ➢ Hack saws ➢ Chisels ➢ Shears ➢ Files ➢ Drills ➢ Reamers ➢ Taps and dies - Pipe cutting, bending and flaring - Identify and use general workshop tools for cleaning, lubrication etc.			
1.5 Use of workshop tools	Identify and use the workshop equipment efficiently and safely	- Identify and use the Bench Vise - Identify and use the electric tools ➢ Drill Machine ➢ Bench Grinder ➢ Air Compressor ➢ Jacks and Lifts ➢ Arbor and Hydraulic Press ➢ Washer Tanks	9 Hrs	• Workshop Tools as in Column 3	Class room and Institute workshop
1.6 Behave professionally in automotive workshop	Behave professionally in the workshop	- Behave professionally - Display good attitude with colleagues and customers - Display good attitude to the work at hand	6 Hrs		Class room

Module 2 Title: Diagnosing and Servicing the Engine
Objective of the Module: Perform maintenance, diagnosis and service work on engine efficiently)
Duration: 717 hours **Theory:** 115 hours **Practice:** 602 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
2.1 Diagnose and Service Engine	- Learner will be able to explain the working of an engine. - Identify Engine components - Dismantle, check and assemble engine.	Explain: - Engine and its types - 4 stroke petrol engine working. - 2 stroke petrol engine working - Working of diesel engine. - Spark Ignition Engine - Describe construction and function of: ➢ Cylinder heads ➢ Valve mechanisms ➢ Cylinder blocks ➢ Piston, piston rings and pins ➢ Connecting rod and big end bearings ➢ Crank shaft and main journal bearings ➢ Fly wheels - Remove the engine from the car - Dismantle the engine - Inspect and check the engine parts - Engine timing (valve and ignition) - Assemble the engine - Adjusting tappet clearance - Fit the engine in the car - Start the engine - Perform Compression test	282 Hrs	• General mechanics tool kit • Lifting equipment • Torque wrench • Bench Vice • Valve seat cutter/Lapping Stick • Micrometer • Vernier calipers • Pullers of different size • Straight edge. • Valve spring compressor • Valve spring tester • Cotton Waste • Kerosene oil • Compression gauge/tester • Cleaning equipment • Hydraulic press • Engine oil and grease • Diesel and petrol fuel • Metal pans for cleaning tray.	Class Room and institute workshop Auto mobile workshop
2.2 Diagnose and Service Fuel Systems	Learner will be able to identify, service and repair the fuel systems: - Carburetor E.F.I. - C.N.G. - Diesel fuel injection	- Describe the purpose of a fuel system - Describe Air fuel ratios - Describe construction, function and operation of fuel systems ➢ Fuel tank ➢ Fuel pumps ➢ Fuel and air filters ➢ Thermostatic air cleaner ➢ Carburetor circuits and attachments ➢ Fuel gauges	283 Hrs	• General mechanic tools kit • Lifting equipment • Fuel pressure gauge • Torque wrench • Oscilloscope multi meter • Computer lead box diagnosis systems and interface box • Tachometer	Class room / Institutional workshop and auto mobile workshop

		➢ Replacing fuel pumps and checking pressure and capacity ➢ Replace air and fuel filters - Carburetor service ➢ Dismantle, check and assemble the carburetor ➢ Setting float level ➢ Setting idle speed & mixture ➢ Diagnose fuel system troubles ➢ Describe E.F.I. systems (T.B.I. & P.F.I) - Explain the function of: ➢ E.C.M/ E.C.U ➢ Sensors (throttle, MAP, Coolant, O_2, Crank position sensor etc.) ➢ Actuators ➢ Malfunction indicator light ➢ Checking E.F.I. Systems ➢ Checking and cleaning fuel injectors ➢ Relieving fuel line pressure ➢ Re-setting inertia switch ➢ Testing fuel pressure regulator ➢ On board diagnostics ➢ Retrieve the trouble codes ➢ Using scan tool ➢ Checking sensors ➢ Diagnosing E.C.M. - Explain the construction and function of C.N.G. supply systems - Adjust the mixture - Explain the construction and function of diesel injection systems components - List the types of combustion chambers - Replace the diesel filter - Bleeding diesel fuel injection system - Adjust the fuel injector pressure - Set the injection timing - Trouble shoot the diesel fuel system - Explain purpose and working of super, turbo charger and inter cooler		• Cleaning equipment • Test lamp • Bench vice • Scan tools • Exhaust gas analyzer • Special tools as per manufacturer's recommendations • Compressed air	
2.3 Diagnose and service the lubricating	Trainee will be able to diagnose and repair the	- Explain the purpose, construction and working of an engine lubricating systems - Chang oil and filters	16 Hrs	• General mechanic tool kit • Oil filter wrench • Sealant	Class room / Institutional workshop and

systems	lubricating system	- Service oil pumps - Checking oil pressure - Diagnose Troubles		• Lifting equipment • Scarper • Oil funnel • Recommended oil • Waste oil drum	auto mobile workshop
2.4 Diagnose and Service of Cooling Systems	Trainee will be able to diagnose and repair the cooling system	- Explain the purpose, construction and working of engine cooling systems - Describe the function of radiator cap - Check/ test radiator cap - Test the thermostat valve - Adjust the fan belt - Replace the water pump - Replace the hose pipe - Diagnose for problems	26 Hrs	• General mechanic tool kit • Multi meter • Radiator cap tester • Temperature gauge • Hoses • Clamps	Class room / Institutional workshop
2.5 Diagnose and Service of Ignition systems	Trainee will be able to diagnose and service the ignition system	- Explain the purpose, construction and operation of ignition systems (battery, ignition switch, blast resistance, ignition coil, distributor and spark plugs) - Explain spark plugs types - Testing spark - Replace C.B. Point - Test ignition coil - Service of spark plugs - Setting of ignition timing - Use ignition timing light - Use dwell angle tester - Diagnose for problems - Explain pick up coil ignition, high energy ignition, hall effect switch, optical photodiode distributor, multiple coil distributor less ignition, crank and cam position sensor, direct multiple coil ignition, direct capacitor and discharge ignition. - Triggering test - Retrieve ignition system troubles - Test with a breakout box - Check air gap of pick up coil ignition - Test pick up coil, hall effect switch - Check ignition module	75 Hrs	• Test lamp • Engine analyzer • Dwell / tacho meter • Condenser Tester • Spark plug deep socket set • Insulation tester • General mechanic tool kit • Timing light • Plug cleaner and tester • Hand vacuum pump • Soldering iron **SPARES** • Condensers • C.B. Points • High tension cables • Spark plugs **INSTRUCTIONAL DATA** • Manufacturer's manuals • Equipment operational manuals • Drawings • Circuit diagrams	Class room / Institutional workshop and auto mobile workshop

2.6 Service and diagnose the emission control systems	Trainee will be able to diagnose and repair the P.C.V. system	- Introduction of emission control systems - Explain positive crank case ventilation (P.C.V), evaporative control emission, exhaust gas recirculation, and Catalytic converters. - Service of P.C.V. systems - Service thermostatic air cleaner - Explain safety precautions of catalytic converter	15 Hrs	• General mechanic tool kit	Class room / Institutional workshop and auto mobile workshop
2.7 Service of Exhaust system	Trainee will be able to diagnose and replace the Exhaust system parts	- Explain the purpose and construction of exhaust systems - Service exhaust systems	20 Hrs	• General mechanic tool kit	Class room / Institutional workshop and auto mobile workshop

Module 3 Title: Service of Power Train
Objective of the Module: Diagnose and service the power train components amicably
Duration: 244 hours **Theory:** 40 hours **Practice:** 204 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
3.1 Diagnose and Service the Clutch Systems	Trainee will be able to diagnose and service the clutch system	- Explain the purpose, construction and operation of a clutch - Explain the types of clutch - Explain the clutch linkages - Remove, check and reinstall the clutch assembly - Clutch master cylinder service and bleeding. - Adjust clutch pedal free play - Trouble shooting.	59 Hrs	• Mechanic's tool kit • Clutch aligning tool • Emery paper • Grease • Clutch plate • Pressure plate • Thrust bearing • Clutch cable • Brake oil • Steel rule • Fly wheel	Class room / Institutional workshop and auto mobile workshop
3.2 Diagnose and service of Transmission and transaxle	Trainee will be able to diagnose and repair the transmission & transaxle system	Explain: - Define gear ratio - Purpose, construction and function of 4 speed synchromesh gearbox / transaxle - Introduction to automatic gears - Remove input shaft, output shaft assembly and countershaft - Checking and inspection of parts - Reassembly - Trouble shooting	88 Hrs	• Mechanic's tool kit • Transmission oil • Pan for dismantling • Transmission/Transaxle	Class room / Institutional workshop and auto mobile workshop
3.3 Service the drive line	Trainee will be able to check & service the drive line	Explain: - The purpose of a propeller shaft - Construction and function of universal joint and slip joints - Remove, check and install a propeller shaft - Trouble shooting	29 Hrs	• Mechanics tool kit • Jacks and stands • Dial indicator with magnetic stand • V-Block	Class room / Institutional workshop and auto mobile workshop

3.4 Diagnose & service the differential and axle assembly	Trainee will be able to check & service differential and axle assembly	Describe: - The purpose, function and construction of differential and axles (rear and front) - Remove, dismantle, check and assemble the differential - Adjust back lash - Remove, check and refit front drive axle - Refit front drive axle - Adjust wheel bearings - Trouble shooting	68 Hrs	• Mechanic's tool kit • Shims, Bearing • Differential oil • Boot & boot-clips • Grease (silicon base) • Sealant & Gaskets • Cleaning liquids • Oil seals • Jack & stands • Rags	Class room / Institutional workshop and auto mobile workshop

Module 4 Title: Servicing Chassis Systems
Objective of the Module: Diagnose and repair of chassis systems efficiently
Duration: 341 hours **Theory:** 69 hours **Practice:** 272 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
4.1 Diagnose and Service the suspension system	Trainee will be able to diagnose and service the suspension systems	- Explain the purpose of suspension systems - Explain the types of suspension system - Check and replace shock absorbers/refill - Remove and refit leaf springs - Remove and refit of Mc-Pherson struts	46 Hrs	• Mechanics tool kit • Garage Jacks • Trolley Jack • Coil spring compressor • Safety stands	Class room / Institutional workshop and auto mobile workshop
4.2 Diagnose and Service the steering systems	Trainee will be able to diagnose and service the steering systems	- Explain: - The purpose, construction and types of steering systems (Mechanical & Power) - The steering linkages - Explain wheel balance and steering geometry - Service steering gear boxes - Adjust steering wheel free plate - Check and replace the tie rods - Wheel balance - Check Toe in camber, caster, steering axis inclination (S.A.I) toe-in & toe-out on turn - Adjust angles - Trouble shooting	175 Hrs	• Mechanics tool kit • Garage Jacks • Safety stands • Wheel balancing machine • Wheel alignment equipment	Class room / Institutional workshop and auto mobile workshop
4.3 Diagnose and Service the brake system	Trainee will be able to diagnose and service the brake systems	- Explain the purpose of brakes - Describe the construction, function & types of brakes - Explain the function of parking brakes - Replace and adjust the brake shoes - Check and replace the disc pads - Check the brake servo unit - Service the master cylinders	120 Hrs	• Mechanics tool kit • Vehicle Lifting Jacks & Safety stands **MATERIALS** • Brake oil • Grease • Repair kits (Master and wheel	Class room / Institutional workshop and auto mobile workshop

		- Service the wheel cylinder - Bleeding the brakes - Adjust parking brakes - Trouble shooting		cylinder) • Brake pads • Brake shoes • Brake hoses and pipes • Vinyl tube and container • Emery paper	

Module 5 Title: Servicing Automotive Electrical Components
Objective of the Module: Perform important electrical tasks required for an engine technician
Duration: 90 hours **Theory:** 20 hours **Practice:** 70 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
5.1 Maintenance of the automotive electrical components	Trainee will be able to perform maintenance of the automotive electrical components.	- Describe conductor and insulator - Explain ampere, volt, and resistance - Explain series and parallel circuits - Explain magnet and magnetism - Explain the purpose and function of • Battery • Self starter • Alternator - Connect resistances in series and parallel circuits - Use volt meter and ampere meter - Use of ohm meter - Perform battery maintenance - Cranking motor wiring circuit - Remove and reinstall battery, alternator and self-starter - Replace fuses and bulbs	90 Hrs	• Auto wire • Thimble • Thimble plier • Ampere meter, volt meter, Multi meter • Bulbs and holders • Soldering iron, paste and wire • Hydrometer • Battery charger • Distilled water • Insulation tapes • Lamp tester • Battery clamps • Battery service kit • Mechanic tool kit	Class room / Institutional workshop and auto mobile workshop

Module 6 Title: Application of Related Studies (Technical Maths & Drawing)
Objective of the Module: 1.Apply simple mathematical rules important in workshop
2.Explain construction and function of components of various automotive systems
Duration: 114 hours **Theory:** 54 hours **Practice:** 60 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
6.1 Mathematics	Trainee will be able to solve mathematical problems	Calculate - Addition - Subtraction - Multiplication - Division - Fractions - Decimals - Percentage	40 Hrs	• Technical Mathematics Book	Class Room
6.2 Technical drawing	Trainee will be able to identify and sketch out the construction and function of components of Automotive systems.	- Define types of lines, dimensions and lettering - Define three views - Define full section and half section Complete the sketch/block/circuit diagram of the following: - 4 stroke engine operation - 2 stroke engine operation - Lubrication flow - Coolant circulation - Working of fuel pumps - Working of carburetors (Idle/High speed circuit) - Battery coil ignition (Circuit diagram) - Electronic ignition (Circuit diagram) - Clutch function (Engage and disengage position) - 4 speed synchromesh transmission (Power flow in different gears) - Differential function on turn - Brake Master cylinder working (Tendum, single) - Brake shoe assembly	74 Hrs	• Technical Drawing Book	Class Room

		- Steering linkages (Label the diagram) - Wheel alignment angles (Sketch) - Series and parallel circuits (complete the circuit) - Cranking motor circuit (complete the circuit) - Charging circuit (complete the circuit)			

Assessment

Module 1: Automotive Workshop Basics

Learning Units	Theory hours	Workplace hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
1.1 Apply safety precautions	3	3	- Describe personal safety Tools and machine safety - Job safety - Environment safety - Demonstrate proper use of the fire extinguishers	• Observation • Oral Questions	
1.2 Measuring	5	15	Explain: - Measure units of mass, volume, length and time in Imperial/Metric System - Measure units in metric system - Identify and use with: • Steel rules • Vernier Caliper • Micrometer • Dial Gauge	• Question Paper • Measuring Job	
1.3 Use of Fasteners, Sealants and Gaskets	4	10	- Define fastener and its types - Identify auto motive fasteners - Use of Circlips - Select and use of sealants - Explain purpose and materials of Gaskets - Identify Gaskets and “O” rings - Removing of broken studs/bolts	• Oral questions • Checking the Job • Oral Questions • Checking Measurement • Fitting • Use	
1.4 Use of Hand Tools	5	34	- Identify and use fitting tools ➢ Screw Drivers ➢ Spanners ➢ Socket Set ➢ Allen Key ➢ Adjustable Wrench ➢ Torque Wrench - Identify and use striking tools ➢ Hammers ➢ Punches	• Questioning • Demonstration	

			- Identify and use pliers - Identify and use pullers ➢ Removing and refitting of bearings - Identify and use cutting tools ➢ Hack saws ➢ Chisels ➢ Shears ➢ Files ➢ Drills ➢ Reamers ➢ Taps and dies - Pipe cutting, bending and flaring - Identify and use general workshop tools for cleaning, lubrication etc.		
1.5 Use of workshop tools	3	6	- Identify and use the Bench Vise - Identify and use the electric tools ➢ Drill Machine ➢ Bench Grinder ➢ Air Compressor ➢ Jacks and Lifts ➢ Arbor and Hydraulic Press ➢ Washer Tanks	• Question & Demonstration	
1.6 Behave in automotive workshop	2	4	- Behave professionally - Display good attitude with colleagues and customers - Display good attitude to the work at hand	• Oral questions	

Module 2: Diagnosing and Servicing the Engine

Learning Units	Theory hours	Workplace hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
2.1 Diagnose and Service the Engine	40	242	Explain: - Engine and its types - 4 stroke petrol engine working. - 2 stroke petrol engine working - Working of diesel engine. - Spark Ignition Engine - Describe construction and function of: ➢ Cylinder heads ➢ Valve mechanisms ➢ Cylinder blocks ➢ Piston, piston rings and pins ➢ Connecting rod and big end bearings ➢ Crank shaft and main journal bearings ➢ Fly wheels - Remove the engine from the car - Dismantle the engine - Inspect and check the engine parts - Engine timing (valve and ignition) - Assemble the engine - Adjusting tappet clearance - Fit the engine in the car - Start the engine - Perform Compression test	Questions & Answers Continues Checking of Job Checking	
2.2 Diagnose and Service Fuel Systems	40	243	- Describe the purpose of a fuel system - Describe Air fuel ratios - Describe construction, function and operation of fuel systems ➢ Fuel tank ➢ Fuel pumps ➢ Fuel and air filters ➢ Thermostatic air cleaner ➢ Carburetor circuits and attachments ➢ Fuel gauges ➢ Replacing fuel pumps and checking pressure and capacity ➢ Replace air and fuel filters	Questions & Answers Written / Oral Checking the method of	

			- Carburetor service ➢ Dismantle, check and assemble the carburetor ➢ Setting float level ➢ Setting idle speed & mixture ➢ Diagnose fuel system troubles ➢ Describe E.F.I. systems (T.B.I. & P.F.I) - Explain the function of: ➢ E.C.M. ➢ Sensors (throttle, MAP, Coolant, O_2, Crank position sensor etc.) ➢ Actuators ➢ Malfunction indicator light ➢ Checking E.F.I. Systems ➢ Checking and cleaning fuel injectors ➢ Relieving fuel line pressure ➢ Re-setting inertia switch ➢ Testing fuel pressure regulator ➢ On board diagnostics ➢ Retrieve the trouble codes ➢ Using scan tool ➢ Checking sensors ➢ Diagnosing E.C.M. - Explain the construction and function of C.N.G. supply systems - Adjust the mixture - Explain the construction and function of diesel injection systems components - List the types of combustion chambers - Replace the diesel filter - Bleeding diesel fuel injection system - Adjust the fuel injector pressure - Set the injection timing - Trouble shoot the diesel fuel system - Explain purpose and working of super, turbo charger and inter cooler	work Questions & Answers Written / Oral Checking the job Questions and answers Checking the job Question and answers Checking the job Question and answers	
2.3 Diagnose and service the lubricating systems	3	13	- Explain the purpose, construction and working of an engine lubricating systems - Change of oil and filters - Service oil pumps - Checking oil pressure - Diagnose Troubles	Question and answer Checking the job	

2.4 Diagnose and Service of Cooling Systems	5	21	- Explain the purpose, construction and working of engine cooling systems - Describe the function of radiator cap - Test the thermostat - Adjust the fan belt - Replace the water pump - Replace the hose pipe - Diagnose for problems	Questions and answers Checking the job	
2.5 Diagnose and Service of Ignition systems	15	60	- Explain the purpose, construction and operation of ignition systems (battery, ignition switch, blast resistance, ignition coil, distributor and spark plugs) - Explain spark plugs types - Testing spark - Replace C.B. Point - Test ignition coil - Service of spark plugs - Setting of ignition timing - Use ignition timing light - Use dwell angle tester - Diagnose for problems - Explain pick up coil ignition, high energy ignition, hall effect switch, optical photodiode distributor, multiple coil distributor less ignition, crank and cam position sensor, direct multiple coil ignition, direct capacitor and discharge ignition. - Triggering test - Retrieve ignition system troubles - Test with a breakout box - Check air gap of pick up coil ignition - Test pick up coil, hall effect switch - Check ignition module	Question and answers Checking the job	
2.6 Service and diagnose the emission control systems	5	10	- Explain the purpose of Emission control systems - Explain positive crank case ventilation (P.C.V), evaporative control emission, exhaust gas recirculation, and Catalytic converters. - Service of P.C.V. systems - Service thermostatic air cleaner - Explain safety precautions of catalytic converter	Question and answers Checking the job	
2.7 Service of	7	13	- Explain the purpose and construction of exhaust systems	Question and Answer	

Exhaust system			- Service exhaust systems		

Module 3: Service of Power Train

Learning Units	Theory hours	Workplace hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
3.1 Diagnose and Service the Clutch Systems	9	50	- Explain the purpose, construction and operation of a clutch - Explain the types of clutch - Explain the clutch linkages - Remove, check and reinstall the clutch assembly - Clutch master cylinder service and bleeding. - Adjust clutch pedal free play - Trouble shooting.	Questions and answers Checking the job	
3.2 Diagnose and service of Transmission and transaxle	13	75	Explain: - Define gear ratio - Purpose, construction and function of 4 speed synchromesh gearbox / transaxle - Introduction to automatic gears - Remove input shaft, output shaft assembly and countershaft - Checking and inspection of parts - Reassembly - Trouble shooting	Questions and answers Checking the job	
3.3 Service the drive line	5	24	Explain: - The purpose of a propeller shaft - Construction and function of universal joint and slip joints - Remove, check and install a propeller shaft - Trouble shooting	Questions and answers Checking the job Questions and answers	
3.4 Diagnose & service the differential and axle	13	55	Describe: - The purpose, function and construction of differential and axles (rear and front) - Remove, dismantle, check and assemble the	Questions and answers Checking the job	

assembly			differential - Adjust back lash - Remove, check and refit front drive axles, - Adjust wheel bearings - Trouble shooting	Questions and answers	

Module 4: Servicing Chassis Systems

Learning Units	Theory hours	Workplace hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
4.1 Diagnose and Service the suspension system	9	37	- Explain the purpose of suspension systems - Explain the types of suspension system - Check and replace shock absorbers/refill - Remove and refit leaf springs - Remove and refit of Mc-Pherson struts	Questions and answers Checking the job	
4.2 Diagnose and Service the steering systems	40	135	- Explain: - The purpose, construction and types of steering systems (Mechanical & Power) - The steering linkages - Explain wheel balance and steering geometry - Service steering gear boxes - Adjust steering wheel free plate - Check and replace the tie rods - Wheel balance - Check Toe in camber, caster, steering axis inclination (S.A.I) toe-in & toe-out on turn - Adjust angles - Trouble shooting	Questions and answers Checking the job	
4.3 Diagnose and Service the brake system	20	100	- Explain the purpose of brakes - Explain the construction, function & types of brakes - Replace and adjust the brake shoes - Check and replace the disc pads - Check the brake servo unit - Service the master cylinders - Service the wheel cylinder - Bleeding the brakes - Adjust parking brakes - Trouble shooting	Questions and answers Checking the job	

Module 5: Servicing Automotive Electrical

Learning Units	Theory hours	Workplace Hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
5.1 Maintenance of the automotive electrical components	20	70	- Explain conductor and insulator - Explain ampere, volt, and resistance - Explain series and parallel circuits - Explain magnet and magnetism - Explain the purpose and function of • Battery • Self starter • Alternator - Connect resistances in series and parallel circuits - Use volt meter and ampere meter - Use of ohm meter - Perform battery maintenance - Cranking motor wiring circuit - Remove and reinstall battery, alternator and self-starter - Replace fuses and bulbs	Questions and answers Checking the job	

Module 6: Application of Related Studies

Learning Units	Theory hours	Workplace hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
7.1 Mathematics	40	-	Calculate - Addition - Subtraction - Multiplication - Division - Fractions - Decimals - Percentage	Questions and answers	
7.2 Technical drawing	14	60	- Define types of lines, dimensions and lettering - Define three views - Define full section and half section Complete the sketch/block/circuit diagram of the following: - 4 stroke engine operation - 2 stroke engine operation - Lubrication flow - Coolant circulation - Working of fuel pumps - Working of carburetors (Idle/High speed circuit) - Battery coil ignition (Circuit diagram) - Electronic ignition (Circuit diagram) - Clutch function (Engage and disengage position) - 4 speed synchromesh transmission (Power flow in different gears) - Differential function - Brake Master cylinder working (Tendum, single) - Brake shoe assembly - Steering linkages (Label the diagram) - Wheel alignment angles (Sketch)	Sketching the drawings	

			- Series and parallel circuits (complete the circuit) - Cranking motor circuit (complete the circuit) - Charging circuit (complete the circuit)		

Supportive notes

Assessment Context

- These learning units may be assessed on the job, off the job or a combination of on and off the job demonstrated by an individual working alone. In some areas continuous assessment may be required to gauge the competency.
- Assessment of the practical skills must take place only after a period of supervised practice and repetitive experience. If work place conditions are not available, assessment is simulated and that the work place conditions are acceptable.
- The prescribed outcome must be achieved without direct supervision.
- Competency should be assessed within the context of the qualification being sought.

Critical Aspects

Assessment must confirm that the candidate is able to:

1: Apply the health and safety legislations while working.
2: Use fire extinguishers.
3: Read measurements with measuring tools.
4: Identify and use the automotive fasteners.
5: Select, handle and use hand tools, workshop tools safely and properly.
6: Check the compression pressure of engine and diagnose the faults.
7: Diagnose problems in different fuel systems and make the necessary adjustment.
8: Set the valve and ignition timing.
9: Diagnose and service the lubricating, cooling, ignition systems.
10: Service the clutch and adjust the free play.
11: Remove, dismantle, check, assemble and refit the transmission.
12: Adjust the back lash of differential.
13: Replace the axle bearing.
14: Accuracy of adjustments.
15: Replace the suspension systems components.
16: Carry out the wheel balancing.
17: Carry out the wheel alignment.
18: Service of various mechanical steering gear boxes.
19: Service of power steering.

20: Adjust the brake system.
21: Bleed the brake system.
22: Connect the battery.
23: Wiring up the cranking motor circuit.
24: Identify and connect the charging system connections.
25: Drive the car amicably in forward and reverse speeds in the ground.
26: Apply the mathematical rules in routine work.
27: Identify and demonstrate the drawings.

Assessment Condition

The candidate will have access to:
- All tools, equipment, materials and documentation required.

The candidates will be permitted to refer the following documents.
- Relevant workplace procedures.
- Relevant product and manufacturing specifications.
- Relevant drawings, manuals, codes, standards and reference material.

The Candidate will be required to:
- Orally or by other methods of communication, answer, questions put forward by the assessor.
- Identify superiors who can be approached for the collection of competency evidence where appropriate.
- Present evidence of credit for any off job training related course.

Special Notes

During assessment the individual will:

- Demonstrate safe working practices all the times.
- Communicate information about processes, events or tasks being under taken to ensure a safe and efficient working environment.
- Take the responsibility for the quality of his/her own work.
- Plan tasks in all situations and review tasks requirements as appropriate.
- Perform all tasks in accordance with standard operating procedures.
- Perform all tasks to specifications.
- Use accepted engineering techniques, practices, processes and work place procedures.
- Items requiring specialize repair will be sent to appropriate specialists.

The tasks involved will be completed within reasonable time frames relating to typical work place activities. The resources required for assessment include tools, equipment and machines listed within these learning units. The completed product should comply with the respective industrial standards.

Resources required

Materials, tools, equipment and machines are listed within the learning units.