

IR. MOTOR VEHICLE MECHANIC (JMVM)

Core Qualification File Syllabus

Sl. No.	CONTENT	DETAILS
1.	Occupational safety (8 hrs)	1.1. Basic safety introduction & Personal protection 1.2. Basic injury prevention & elementary first aid 1.3. Safety sign for Danger, Warning, caution and personal safety message 1.4. Use of Fire extinguishers 1.5. Concept of Standard
2	Introduction to IC engine (6 hrs)	2.1 IC engine and its classification 2.2 Working principle of IC engine 2.3 Concept of Two Stroke Engine and Four Stroke engine 2.4 Differences between Diesel engine and Petrol engine
3	Constructional feature of IC engine (12 hrs)	3.1 Name of different parts of an IC engine 3.2 Location and function of <ul style="list-style-type: none">● Cylinder block,● Cylinder liners,● Cylinder head,● Gasket, Piston,● Piston ring,● Piston pin,● Connecting rod,● Crank shaft,● Cam shaft,● Fly-wheel,● Dampers &● Overhead valve 3.3 Hand tools used to overhaul an IC engine
4	Cooling System in IC engine (8 hrs)	4.1 Purpose & types of cooling 4.2 Water cooling system, its components and field of application 4.3 Air cooling system, its components and field of application 4.4 Preventive maintenance of cooling system
5	Lubrication System in IC engine (8 hrs)	5.1 Purpose & types of Lubrication system 5.2 Types of Lubricants 5.3 Wet sump & dry sump Lubrication system 5.4 Lubrication in Petrol & Diesel engine 5.5 Crank case ventilation
6	Fuel System in Petrol Engine (6 hrs)	6.1 Function of Pump feed type fuel supply system 6.2 Function of Mechanical & electrical fuel pump 6.3 Purpose of simple carburetor 6.4 Function of multipoint fuel injection system (MPFI) 6.5 Advantages of MPFI over simple carburetor
7	Fuel System in Diesel Engine (4 hrs)	7.1 Purpose of fuel injection pump 7.2 Location & function of fuel injectors 7.3 Purpose and types of governing system

8	Transmission System (6 hrs)	8.1 Name different items of transmission system and their location 8.2 Types, purpose, and function of automobile clutch 8.3 Components of single plate clutch 8.4 Purpose and function of gearbox
9	Braking System (6 hrs)	9.1 Types of brake used in automobile 9.2 Brake drum assembly and its function 9.3 Function of master cylinder and brake oil 9.4 Function, advantages of disc brake 9.5 Tyre, tube and brake drum assembly
10.	Hand tools used for Auto servicing (4 hrs)	10.1 Specification & use of following tools: Hammer, mallet, wrench, torque wrench, spanner, screw driver, pneumatic wrench, extension bar, pliers, piston ring expander, adjustable wrench, oil change tool, grease gun, oil can, floor jack.
11.	Electrical System (4 hrs)	11.1 Function of battery and starter motor 11.2 Identification, Function and location of Spark plug
Total		72 hrs

Detail of Practical Syllabus

SL NO	CONTENT (Any Eight)	DETAILS
1	Over hauling of cylinder head of diesel engine (bus/truck) (8 hrs)	1.1. Dismantling of cylinder head of a diesel engine 1.2. Dismantling rocker arm, tappet & valve assembly 1.3. Washing and cleaning different parts with kerosene and compressed air 1.4. Refitting rocker arm, tappet & valve assembly 1.5. Refitting of cylinder head of a diesel engine
2	De-carbonizing of multi-cylinder four stroke petrol/diesel engine and fitting of piston & piston rings. (8 hrs)	2.1 Dismantling cylinder head and open cylinder block 2.2 Dismantling crank, connecting rod and piston assembly 2.3 Dismantling piston from connecting rod 2.4 Clean each item with kerosene oil and compressed air 2.5 Check 'O' ring and compression ring fitted in piston 2.6 Defective 'O' ring is to be replaced 2.7 Defective compression ring is to be replaced 2.8 Refitting all items one by one with reverse sequence that of applied previously.
3	Gasket cutting practice (car/bus/truck). (8 hrs)	3.1 Dismantling cylinder head and cylinder block 3.2 Remove the gasket in between 3.3 Clean the joining faces by kerosene and compressed air 3.4 Check the gasket whether it is damaged in any part 3.5 Cut the damaged part from the gasket 3.6 Place the partially cut gasket on the cylinder block face by grease 3.7 Fresh cut gasket which has the length equal to the damaged part is then fitted within the old gasket with the help of grease 3.8 Refitting the cylinder head on cylinder block
4	Performing lubrication in Diesel and Petrol engine (8 hrs)	4.1 Inspect suction filter and screens 4.2 Remove and clean strainer 4.3 Change line filter (pressure filter) 4.4 Inspect flexible hoses for cracks, punctures and wear 4.5 Check tubing/pipe for flattening or breaks.

		4.6 Check for leaking or “weeping” at all connections 4.7 Monitor system for unusual drops or increases in operating pressure
5	Dismantling and cleaning of MPFI (8 hrs)	5.1 Locate the MPFI Components in the given engine 5.2 Identify and locate the sensors fitted in the given MPFI engine 5.3 Ascertain and select tools and materials for the job and make this available for use in a timely manner 5.4 Plan work in compliance with standard safety norms. Test the MPFI fuel pump 5.5 Test the MPFI fuel Injector 5.6 Test the Idle Air control valve 5.7 Test the MPFI fuel pressure regulator
6	Overhauling of single/multi plate clutch (8 hrs)	6.1 Mark the pressure plate and clutch cover position with respect to each other. 6.2 Place the clutch assembly on the clutch drive aligning the slot on the clutch finger with the thrust and seal on the pressure plate. 6.3 Compress the spring cups by clutch. 6.4 Loosen the mounting seat screw of the rotating plate on the retaining plate so removed. 6.5 Loosen the mounting seat screw of the clutch finger brackets and eccentric Pins. 6.6 Visually check the fly wheel, ring gear and pressure for crankshaft. 6.7 Check the flatness of friction faces of the pressure plate with straight edge. 6.8 If flatness is not found within the specific limit without the pressure plate and flywheel can ground so not ground below the minimum specific thickness. 6.9 Check the free length and tension of pressure spring. 6.10 Check the pressure plate tension usually for any damage. Replace the clutch plate if any torsion spring found damaged. 6.11 Measure the thickness of clutch lever. Release if thickness of clutch lever is less than specified. 6.12 Place the clutch fingers bush in the clutch fingers. 6.13 Fit the clutch bracket with eccentric pin. 6.14 Hand tighter the mounting set screw of clutch bracket. 6.15 Align the marks of clutch plate and pressure plate and place the clutch over the pressure plate. 6.16 Compress the spring with clutch finger. 6.17 Place the pressure pad on the pressure plate and tighten the pad mounting set screws. 6.18 Release the load from the spring and remove clutch cover assembly from the clutch jig. 6.19 Place the withdrawn plate, retaining plate on the clutch jig finger; tighten mounting set screws of the withdrawn plate.
7	Replace Defective Tyre & tube assembly with new one (8 hrs)	7.1 Remove Wheel Covers 7.2 Loosen the Lug Nuts Halfway 7.3 Secure the Jack 7.4 Remove the Lug Nuts Completely 7.5 Remove the flat-tyre from its frame and replace it with a spare tyre 7.6 Screw Lug Nuts And Replace Wheel Cover
8	Replacing of oil-filter element of ‘full flow’ and	8.1 Draining the Oil and Removing the Old Filter 8.2 Put an oil drain pan underneath the oil drain plug

	'by-pass' oil filter. (8 hrs)	8.3 Remove the oil plug to drain the oil out, and then replace the plug 8.4 Find the oil filter by looking for a metal cylinder attached to the engine block 8.5 Move the oil drain pan underneath the oil filter 8.6 Screw off the oil filter completely by hand/ Use a filter wrench to loosen the oil filter 8.7 Put the old filter face down in the oil pan and let it drain for 24 hours 8.8 Lubricate the gasket on the new oil filter with fresh motor oil 8.9 Screw on the filter by hand until you feel it make contact with the engine block 8.10 Tighten the new filter 1/4 to 3/4 of a turn 8.11 Fill up the engine with fresh motor oil
9	Replacing new battery along with performing soldering (8 hrs)	9.1 Remove cables from battery terminals 9.2 Remove the screws or fasteners holding the battery in place; then Remove the Battery 9.3 Inspect the tray the old battery was resting on 9.4 Position the new car battery on the tray 9.5 Replace the screws/fasteners to the new battery to secure it in place 9.6 Reconnect the battery cables in the reverse order
10	Project (24 hrs)	Two numbers each of 12 hrs
Total		96 hrs.

Details of Project (Any two)

Sl. No.	Content (Any two, each 12 hrs)	Details
1.	Project I	Dismantling and assembling of four stroke four cylinder petrol engine.
2.	Project II	Dismantling and assembling of four stroke four cylinder diesel engine
3.	Project III	Dismantling, overhauling and assembling of latest synchromesh gear box used in Bus/Truck

OUTCOMES

Outcomes to be assessed	Assessment criteria for the outcome
1. Apply safe working Practices	<p>(1.1) Assessor will note whether the trainee is maintaining procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements according to site policy.</p> <p>(1.2) Assessor will judge the trainee on his ability to recognize any unsafe situations according to site policy, and assess his report accordingly.</p> <p>(1.3) Assessor will ask the trainee to demonstrate Safety sign for Danger, Warning, caution and personal safety message accurately.</p> <p>(1.4) Assessor will assess the report/record submitted by trainee to supervisor/ Competent of authority in the event of accident or sickness of any staff, including accident details according to site accident/injury procedures.</p> <p>(1.5) Trainees will be asked to demonstrate basic first aid & CPR and use them under different circumstances.</p> <p>(1.6) Trainees will be asked to identify different fire extinguishers and to use the same as per requirement in a mock drill.</p>
2. Identify different components of IC Engine and its diagnostics	<p>(2.1) Assessor will examine whether the trainee can able to identify different parts of an IC engine.</p> <p>(2.2.) Assessor will examine whether the trainee can able to identify an engine as a Petrol engine or Diesel engine.</p> <p>(2.3) Trainees will be asked to demonstrate the differences between a diesel engine and a petrol engine.</p> <p>(2.4) Trainees will be asked to compare the differences between a two stroke engine and a four stroke engine.</p> <p>(2.5) Assessor will examine whether the trainee can able to name constructional parts of an IC engine.</p> <p>(2.6) Trainees will be asked to define the location and function of cylinder block.</p> <p>(2.7) Assessor will examine whether the trainee can able to explain different parts of the cylinder block sub assembly.</p> <p>(2.8) Trainees will be asked to define the location and function of cylinder liner, cylinder head and gasket.</p> <p>(2.9) Assessor will ask the students to dismantle of cylinder head of a diesel engine along with rocker arm, tappet & valve assembly</p> <p>(2.10) Students may be asked by the assessor to wash and cleaning dismantled IC engine parts with kerosene and compressed air</p> <p>(2.11) Assessor will ask the students to refit cylinder head of a diesel engine after refitting of rocker arm, tappet & valve assembly</p> <p>(2.12) Trainee will be asked to demonstrate Gasket cutting practice (car/bus/truck) in between cylinder head and cylinder block in an IC engine.</p>

(2.13) Trainees will be asked to demonstrate the function and location of different parts of the Piston sub assembly.

(2.14) Assessor will examine whether the trainee is able to define the layout of crankshaft-connecting rod-piston sub assembly.

(2.15) Assessor will ask the students to dismantle cylinder head and open cylinder block along with dismantling crank, connecting rod and piston assembly

(2.16) Students may be asked by the assessor to dismantling piston from connecting rod

(2.17) Students may be asked by the assessor to wash and cleaning each item with kerosene oil and compressed air

(2.18) Students may be asked by the assessor to check and replace 'O' ring and compression ring fitted in piston, if defective

(2.19) Assessor will ask the students to refit all items one by one with reverse sequence that of applied previously.

(2.20) Trainees will be asked the location and function of Crankshaft, Cam shaft, Fly-wheel, Dampers.

(2.21) Assessor will examine whether the trainee is able to describe the necessity of a cooling system for an IC engine.

(2.22) Trainees will be asked to describe different parts of the water cooling system used in IC engines.

(2.23) Trainees will be asked to describe the location and function of different parts of the water cooling system used in IC engines.

(2.24) Assessor will examine whether the trainee is able to describe location and function of different parts of the air cooling system used in IC engines.

(2.25) Assessor will examine whether the trainee is able to demonstrate different preventive maintenance that are taken into part in the cooling system.

(2.26) Assessor will examine whether the trainee is able to describe the purpose and types of lubrication system used for an IC engine.

(2.27) Trainees will be asked to demonstrate the method of checking and repairing (if required) the lubrication system in a Petrol/diesel engine.

(2.28) Assessor will examine whether the trainee is able to demonstrate the method of replacement of the oil-filter element of 'full flow' and 'by-pass' oil filter.

(2.29) Trainees will be asked to explain different types of lubricant with proper examples.

(2.30) Trainees will be asked to explain dry sump and wet sump lubrication systems.

(2.31) Assessor will examine whether the trainee is able to demonstrate lubrication in diesel and petrol engines.

(2.32) Trainee will be asked to explain the purpose and procedure for ventilation of the crankcase.

(2.33) Trainees will be asked to explain the Pump feed type fuel supply system and its function.

	<p>(2.34) Assessor will examine whether the trainee is able to compare the differences between electrical and mechanical fuel pumps.</p> <p>(2.35) Trainees will be asked to explain the function of a carburetor.</p> <p>(2.36) Assessor will examine whether the trainee is able to demonstrate function of multipoint fuel injector (MPFI).</p> <p>(2.37) Trainees will be asked to explain advantages of MPFI over simple carburetors.</p> <p>(2.38) Trainees will be asked to demonstrate minor preventive maintenance done in MPFI.</p> <p>(2.39) Trainees will be asked to explain the function of the fuel injection system.</p> <p>(2.40) Assessor will examine whether the trainee is able to describe the location and purpose of the fuel injector.</p> <p>(2.41) Assessor will examine whether the trainee is able to explain the purpose and types of governing system.</p> <p>(2.42) Assessor will examine whether the trainee is able to demonstrate project work on dismantling and assembling a four stroke four cylinder petrol engine.</p>
3. Identify different components of Transmission system and its diagnostics	<p>(3.1) Assessor will examine whether the trainee is able to explain the layout of different elements of a transmission system used in a motor vehicle.</p> <p>(3.2) Trainees will be asked to describe types, purpose, and function of automobile clutch.</p> <p>(3.3) Trainees will be asked to describe different components of a single plate clutch.</p> <p>(3.4) Assessor will examine whether the trainee is able to demonstrate overhauling of single/multi plate clutch.</p> <p>(3.5) Trainees will be asked to describe the purpose of a gear box.</p> <p>(3.5) Assessor will examine whether the trainee can able to demonstrate project work on dismantling, overhauling and assembling of latest synchromesh gear box used in Bus/Truck</p>
4. Identify different components of Braking system and its diagnostics	<p>(4.1) Trainees will be asked to state about different types of brakes used in motor vehicles.</p> <p>(4.2) Trainees will be asked to describe different components and functions of different components of a brake drum assembly.</p> <p>(4.3) Trainees will be asked to explain the function of a master cylinder and brake oil.</p> <p>(4.4) Trainees will be asked to explain the functions and advantages of a disc brake.</p> <p>(4.5) Assessor will examine whether the trainee is able to demonstrate different components of a tyre, tube and brake drum assembly.</p> <p>(4.6) Assessor will examine whether the trainee is able to demonstrate for replacement a punctured tyre with a new one.</p>

<p>5. Identify different Electrical Components of Automobile and its diagnostics</p>	<p>(5.1) Assessor will examine whether the trainee is able to explain the function of battery and starter motor.</p> <p>(5.2) Trainees will be asked to identify a spark plug as well as describe its function and location.</p> <p>(5.3) Trainee will be asked to replace a new battery in a vehicle</p> <p>(5.4) Assessor will examine whether the trainee can able to demonstrate the soldering procedure.</p>
<p>6. Identify different hand tools and demonstrate their use.</p>	<p>(6.1) Assessor will examine whether the trainee can able to explain the specification of different hand tools like - Hammer, mallet, wrench, torque wrench, spanner, screw driver, pneumatic wrench, extension bar, pliers, piston ring expander, adjustable wrench, oil change tool, grease gun, oil can, floor jack.</p> <p>(6.2) Assessor will examine whether the trainee can able to demonstrate the use of different hand tools like - Hammer, mallet, wrench, torque wrench, spanner, screw driver, pneumatic wrench, extension bar, pliers, piston ring expander, adjustable wrench, oil change tool, grease gun, oil can, floor jack.</p>