

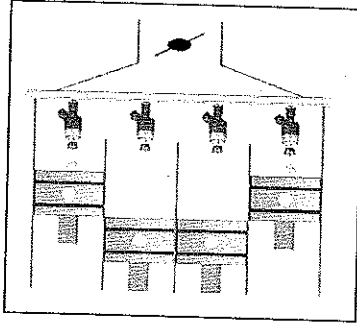
THEORY END-SEM EXAMINATION			
SESSION: 2022-23(SUMMER SEMESTER)			
B.Voc/M.Voc	B.Voc	Semester	1 st /3 rd /5 th
Course Name / Module	Basic of Automobile		
Course Code	AUT1115		
Date			
Name of the Student		Reg. No.	

INSTRUCTION:
<ul style="list-style-type: none"> • Maximum Marks: 50 • Duration of Examination: 2 Hours • Attempt all questions.

1. Section A (10 objective type questions, each question carries 01 mark)	10×1 = 10
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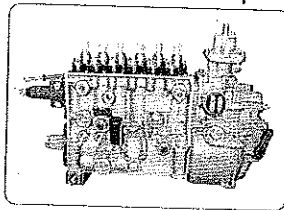
- Q1. Piston's top most position during the piston movement inside the cylinder block is called _____
- BDC
 - Bore
 - TDC
 - Stroke
- Q2. Horse power is _____
- Ability of horse to run
 - Unit of Power
 - Unit of Torque
 - None of above
- Q3. Correct sequence for engine four stroke cycle is:
- Power > Compression > Intake > Exhaust
 - Intake > Power > Compression > Exhaust
 - Compression > Intake > Exhaust > Power
 - Intake > Compression > Power > Exhaust
- Q4. Diesel engine and Petrol engine can be classified under which following category:
- Layout
 - Fuel
 - Fuel injection system
 - Based on stroke
- Q5. Petrol engine are mostly found in applications where high engine:
- Torque is required
 - Power is required
 - Both
 - None of the above
- Q6. Which among the below is/are the function of Fuel System in any vehicle?
- Deliver the Fuel at Correct Time
 - Deliver the Fuel at Correct Pressure
 - Deliver the Fuel at Correct Quantity
 - All of the above

Q7. Identify the type of Fuel injection in the below picture



- a. Carburetor System
- b. Multipoint Fuel Injection System
- c. Single Point Fuel Injection
- d. Common Rail Direct Injection System

Q8. Identify the Fuel Pump in the below picture



- a. Inline Pump
- b. Distributor Pump
- c. Electric Pump
- d. High Pressure Pump

Q9. Which among the below is not a part of the Cooling System?

- a. Radiator
- b. Thermostat
- c. Air Filter
- d. Cooling Fan

Q10. The Rail Pressure Sensor is supplied with _____ Voltage by the ECM

- a. 2 V
- b. 5 V
- c. 12 V
- d. 15V

2. Section B (04 short answer type questions, each question carries 04 marks)

04×04 = 16

Q11. What do you understand by FWD and RWD Vehicle.

Q12. Write the role/function of automobile technician

Q13. What do you understand by Stroke and swept volume associated with IC Engine?

Q14. Explain gear Ratio? What do you understand by underdrive and overdrive?

Section C (04 long type questions, each question carries 06 marks)

04×06 = 24

Q15. Explain the working of four stroke diesel engine used in Automobiles

Q16. What do you understand by HVLP gun? Explain process of automization.

Q17. Explain rack and pinion steering system used in cars.

Q18. Explain the working of Single plate clutch used in Automobile.

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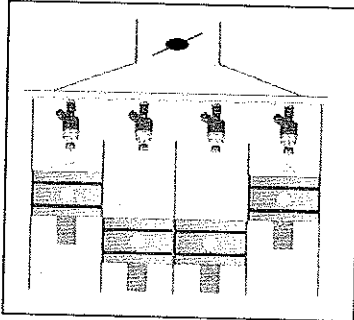
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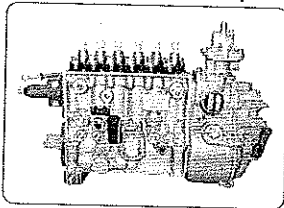
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- All of the above

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- 5 V
- 12 V
- 15V

2. Section B (04 short answer type questions, each question carries 04 marks)

04×04 = 16

Q11. What do you understand by FWD and RWD Vehicle.

Ans: Front-wheel drive sends the power to the front wheels, letting the rear wheels simply roll along. Rear-wheel drive directs powers to the rear wheels, while the front wheels' steer. A vehicle with rear-wheel drive pushes the vehicle forward from the rear wheels while a vehicle with front-wheel drive pulls the vehicle forward.

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Q12. Write the role/function of automobile technician

Ans: Automotive service technicians and mechanics typically do the following:

- Identify mechanical problems, often by using computerized diagnostic equipment.
- Test parts and systems to ensure that they are working properly.
- Follow checklists to ensure that all critical parts are examined.
- Perform basic care and maintenance, including changing oil, checking fluid levels, and rotating tires.
- Repair or replace worn parts, such as brake pads and wheel bearings.
- Disassemble and reassemble parts of Automotive Vehicles.
- Use testing equipment to ensure that repairs and maintenance are effective
- Explain to clients their automotive problems and the repairs done on their vehicles

Q13. What do you understand by Stroke and swept volume associated with IC Engine?

Ans: Stroke : This is the distance travelled by the piston when it travels from top dead center (TDC) to the bottom dead center (BDC).

Swept volume Piston Displacement: It is the volume swept by the piston in moving from top dead center to bottom dead center. It is also called Piston Displacement.

Q14. Explain gear Ratio? What do you understand by underdrive and overdrive?

Ans: The gear ratio is the ratio of the number of turns the output shaft makes when the input shaft turns once. In other words, the Gear ratio is the ratio between the number of teeth on two gears that are meshed together, or two sprockets connected with a common roller chain, or the circumferences of two pulleys connected with a drive belt.

Underdrive refers to gear ratio more than one and Underdrive refers to gear ratio less than one

Section C (04 long type questions, each question carries 06 marks)	04x06 = 24
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Q15. Explain the working of four stroke diesel engine used in Automobiles

Ans: Working principle of IC engine:

Suction stroke: During this stroke, the inlet valve is open and the exhaust valve is closed. Only air is sucked into the cylinder during this stroke. The piston moves from TDC to BDC and the crankshaft rotates through 180°.

Compression Stroke: The air inducted in the cylinder is compressed to the clearance volume. Both valves are closed during this stroke. The piston moves from BDC to TDC and the crankshaft rotates through 360°.

Power stroke or Working stroke: At the end of the compression stroke the fuel (diesel) is injected into the hot compressed air. The rate of injection is such that pressure remains constant instead of the change in the piston position. After injection of the fuel is complete the hot gases expand. The piston moves from TDC to BDC position and the crankshaft rotates through 540° .

Exhaust Stroke: The inlet valve remains closed and the exhaust valve opens. The piston moves from BDC to TDC position which pushes the burnt gases outside the combustion chamber. The crankshaft rotates by two complete revolutions through 720° .

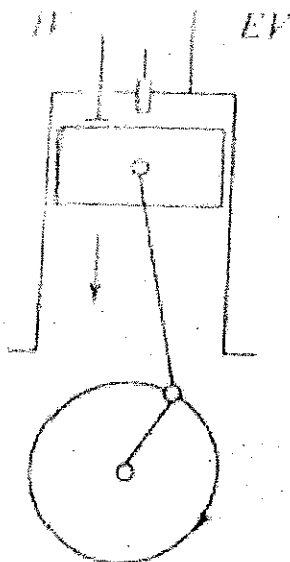
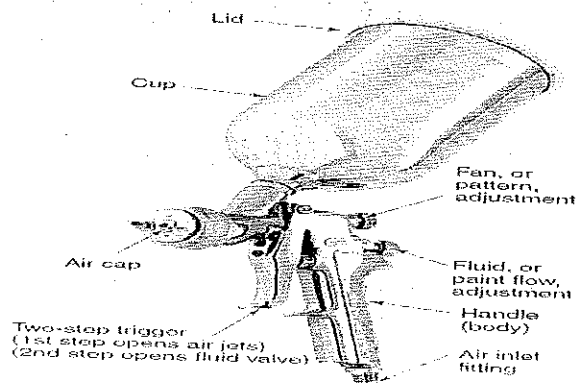


Figure: Working principle of four – stroke C. I. engine

Q16. What do you understand by HVLP gun? Explain process of automization.

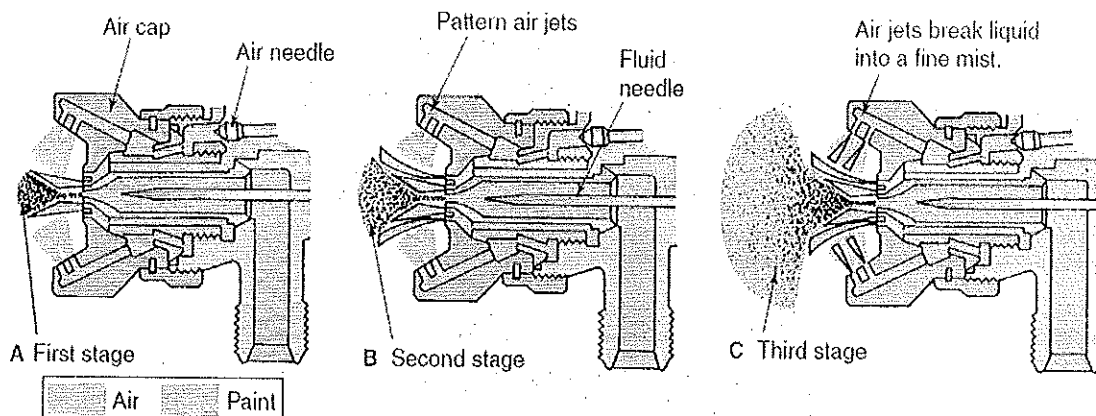
Ans: HVLP stands for high-volume, low-pressure. These guns use high volume of air to push the paint through the nozzle. Dilute the paint to make it thinner, and spray from a distance of five to eight inches.

Parts of a HVLP gun are as follows:



Atomization breaks the liquid material into a fine mist spray of tiny, uniform droplets

1. In the first stage, the paint siphoned from the fluid tip is immediately surrounded by air streaming from the annular ring. This turbulence begins breaking up the paint.
2. The second stage of atomization occurs when the paint stream is hit with jets of air from the containment holes. These air jets keep the paint stream from getting out of control and aid in paint breakup.
3. In the third phase of atomization, the paint is struck by jets of air from the air cap horns. These airstreams hit the paint from opposite sides, causing the paint to form into a fan-shaped spray.



Q17.Explain rack and pinion steering system used in cars.

Ans: The mostly used steering system is rack and pinion and mostly 80 percent of commercial vehicles are using this type. And this is the simplest one, with fewer parts and easy to design. A rack and pinion is a type of linear actuator that comprises of a pair of gears that convert rotational motion into linear motion. A circular gear called "the pinion" engages teeth on a linear "gear" bar called "the rack"; rotational motion applied to the pinion causes the rack to move relative to the pinion, thereby translating the rotational motion of the pinion into linear motion.

In this type of steering gearbox, a pinion is mounted at the end of the steering shaft. The pinion engages with a rack that is provided with a ball joint at each end in order to allow for the rise and fall of the wheel. The rotary motion of the steering wheel is transmitted to the pinion. The circular motion of the pinion is converted into the linear rack movement, which further transmitted to tie rods to the stub axle through the ball joint.

This type of steering gearbox provides sufficiently low gear reduction for cars and it is quite suitable even for heavier motor vehicles if assisted with power. It occupies very less space and less number of linkages.

Working principle of rack and pinion steering gear:

The rack-and-pinion steering box has a pinion, connected to the steering column.

This pinion runs in mesh with a rack that is connected to the steering tie rods. Both the pinion and the rack teeth are helical gears. Helical gearing gives smoother and quieter operation for the driver. Turning the steering wheel rotates the pinion, and moves the rack from side to side. Ball joints at the end of the rack locate the tie-rods and allow movement in the steering and suspension. Mechanical advantage is gained by the reduction ratio. The value of this ratio depends on the size of the pinion. A small pinion gives light steering, but it requires many turns of the steering wheel to travel from the lock, to lock. A large pinion means the number of turns of the steering column is reduced, but the steering is heavier to turn.

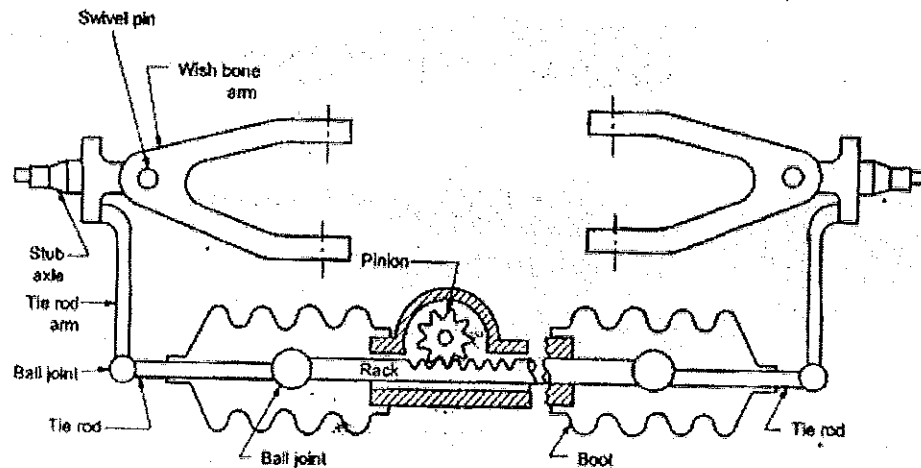
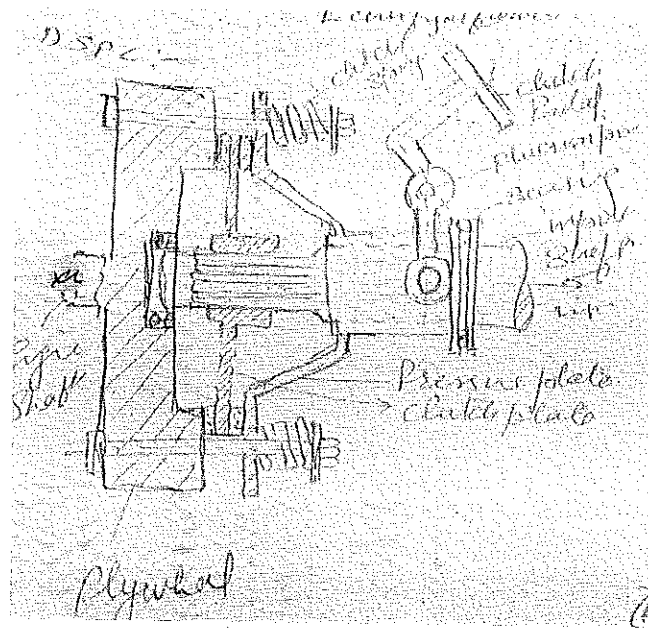


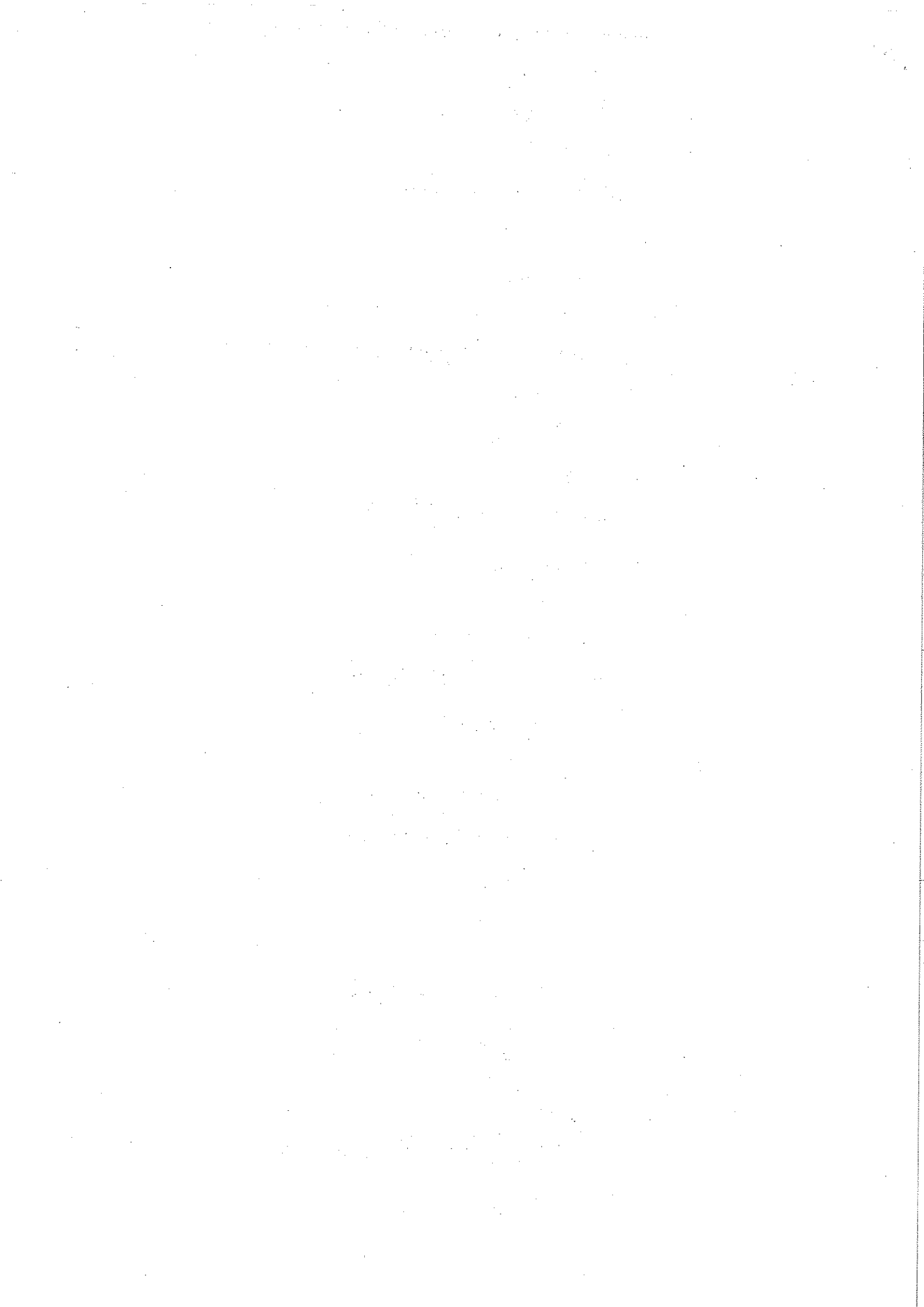
Figure: Rack and Pinion Steering Gear Mechanism.

Q18. Explain the working of Single plate clutch used in Automobile.

Ans: This is the most common type of clutch used in motor vehicles.

The single-plate clutch has only one clutch plate, which is mounted on the spline of the clutch shaft. The flywheel is mounted on the engine crankshaft and rotates with it. The pressure plate is bolted to the flywheel with the help of clutch springs and is free to slide when the clutch pedal is pressed. When the clutch pedal is not pressed, the clutch is called for engagement, and at that time, the clutch plate catches between the flywheel and the pressure plate. There is friction lining on either side of the clutch plate. Therefore, when the clutch is engaged, there is friction between the flywheel, the clutch plate, and the pressure plate. So as the clutch plate rotates, the clutch shaft also rotates. The clutch shaft is connected to the transmission. Thus engine power is transmitted from the crankshaft to the clutch shaft. When the clutch pedal is pressed, the pressure plate moves back against the force of the springs, and the clutch plate is released between the flywheel and the pressure plates. Therefore, the flywheel continues to rotate until the engine is running, and the clutch shaft speed gradually decreases, and eventually, it stops rotating.





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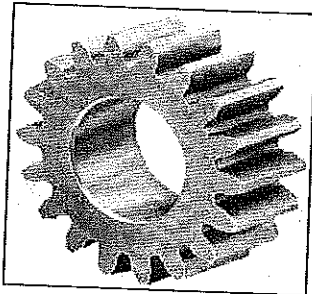
Q1. The mechanism to temporarily disengage & engage the power from the engine to the transmission is called _____

- Gear Box
- Accelerator
- Clutch
- Brake

Q2. Which among the below is not a component of Clutch System?

- Input Shaft
- Clutch Plate
- Pressure Plate
- Flywheel

Q3. Identify the Following Gear Type



- Helical Gear
- Spur Gear
- Bevel Gear
- None of the above

Q4. In Modern Vehicles _____ type of Gear System is widely used

- Sliding Mesh
- Constant Mesh
- Synchromesh
- Reverse Mesh

Q5. The Master Cylinder in a Hydraulic Clutch System is attached to the _____

- Pressure Plate
- Clutch Plate
- Clutch Pedal
- Input shaft

- Q6. Which among the below is/are the function of Fuel System in any vehicle?
- Deliver the Fuel at Correct Time
 - Deliver the Fuel at Correct Pressure
 - Deliver the Fuel at Correct Quantity
 - All of the above
- Q7. Which among the below is not a part of the Cooling System?
- Radiator
 - Thermostat
 - Air Filter
 - Cooling Fan
- Q8. In Modern Vehicles _____ type of Gear System is widely used
- Sliding Mesh
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- Q9. Which of the following not a benefit of using a power steering?
- More efficient
 - Less physical effort
 - Low maintenance
 - Both b & c
- Q10. Steering pumps are connected to _____
- Crankshaft
 - Cam shaft
 - Electric motor
 - Hydraulic pump

2. Section B (04 short answer type questions, each question carries 04 marks)

04×04 = 16

- Q11. Write application of any four components of IC Engine.
- Q12. Explain various safety devices used in automobile.
- Q13. Give the classification of Axles used in Automobile.
- Q14. Give the classification of Steering system

Section C (04 long type questions, each question carries 06 marks)

04×06 = 24

- Q15. Explain the working of four stroke petrol engine used in Automobiles
- Q16. What type of hazards are associated with paint shop? Explain.
- Q17. Explain the working of gear box in brief. What are the advantage of synchromesh gear box over others
- Q18. Write the Classification of Automobile

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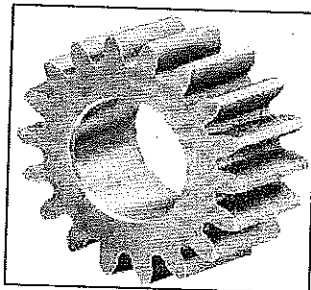
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Q11. Write application of any four components of IC Engine.

Ans: 1. Cylinder-block: Cylinder is the main body of IC engine. Cylinder is a part in which the intake of fuel, compression of fuel and burning of fuel take place. The main function of cylinder is to guide the piston. It is in direct contact with the products of combustion so it must be cooled.

2. Cylinder-head: The top end of the engine cylinder is closed by means of removable cylinder head. There are two holes or ports at the cylinder head, one for intake of fuel and other for exhaust. The

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main function of cylinder head is to seal the cylinder block and not to permit entry and exit of gases on cover head valve engine.

3.Piston:A piston is fitted to each cylinder as a face to receive gas pressure and transmit the thrust to the connecting rod. It is a prime mover in the engine. The main function of piston is to give tight seal to the cylinder through bore and slide freely inside the cylinder.

4.Piston-rings:A piston must be a fairly loose fit in the cylinder so it can move freely inside the cylinder. If the piston is too tight fit, it would expand as it got hot and might stick tight in the cylinder and if it is too loose it would leaks the vapor pressure. To provide a good sealing fit and less friction resistance between the piston and cylinder, pistons are equipped with piston rings. These rings are fitted in grooves which have been cut in the piston.

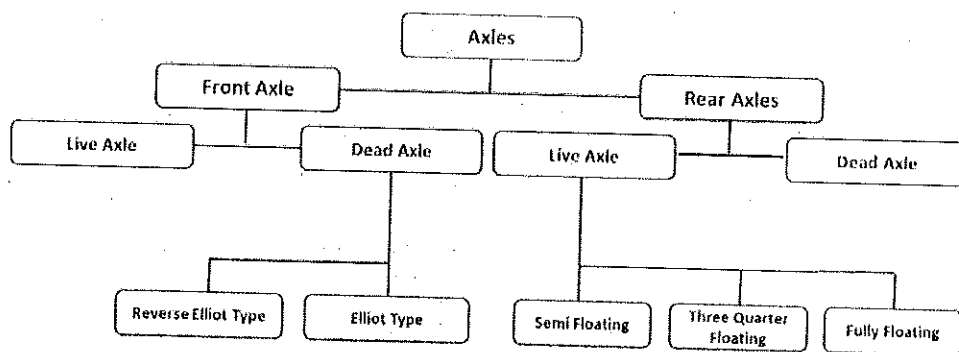
Q12.Explain various safety devices used in automobile.

Ans: These are the following safety equipment's which are used in Automotive Mechanical Department:

1. Safety Goggle: It is used to protect eyes from dust and chemicals while repairing vehicles.
2. Safety shoe: It is used to protect legs from sudden fall of heavy parts.
3. Helmet: It is used to protect the head while working under vehicles.
4. Gloves: It is used to prevent our hand from heated engine.
5. Mechanics Apron: It helps to cover the body of mechanics.

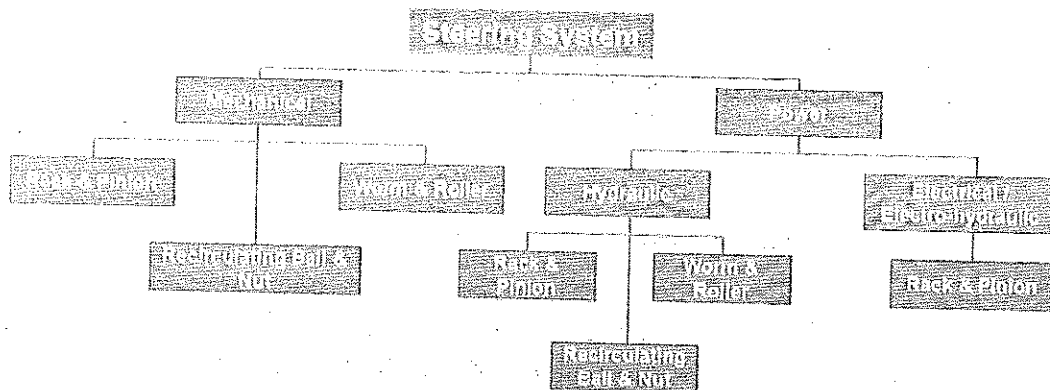
Q13. Give the classification of Axles used in Automobile.

Ans:The various types of Axles are as follows



Q14. Give the classification of Steering system

Ans: Classification of Steering System



Section C (04 long type questions, each question carries 06 marks)

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Q15. Explain the working of four stroke petrol engine used in Automobiles

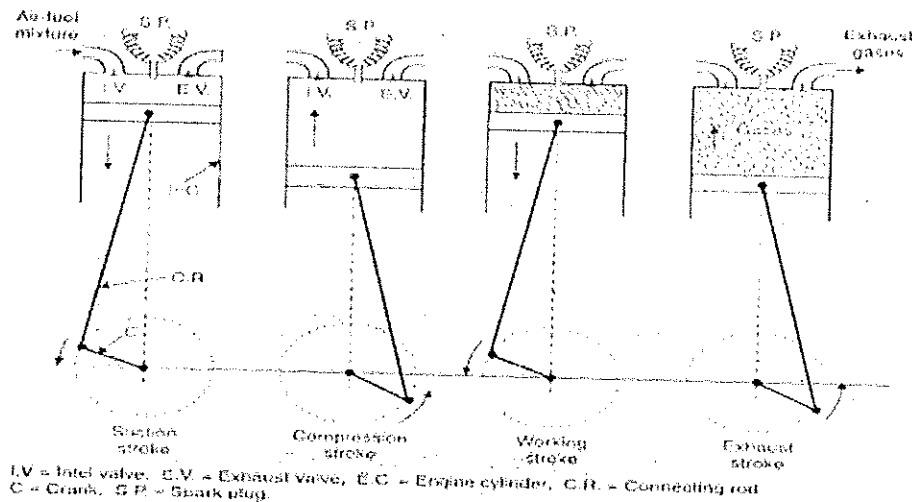
Ans: Working principle of IC engine:

Suction stroke: During this stroke, the inlet valve is open and the exhaust valve is closed. Only air is sucked into the cylinder during this stroke. The piston moves from TDC to BDC and the crankshaft rotates through 180° .

Compression Stroke: The air inducted in the cylinder is compressed to the clearance volume. Both valves are closed during this stroke. The piston moves from BDC to TDC and the crankshaft rotates through 360° .

Power stroke or Working stroke: At the end of the compression stroke the fuel (diesel) is injected into the hot compressed air. The rate of injection is such that pressure remains constant instead of the change in the piston position. After injection of the fuel is complete the hot gases expand. The piston moves from TDC to BDC position and the crankshaft rotates through 540° .

Exhaust Stroke: The inlet valve remains closed and the exhaust valve opens. The piston moves from BDC to TDC position which pushes the burnt gases outside the combustion chamber. The crankshaft rotates by two complete revolutions through 720° .



Q16. What type of hazards are associated with paint shop? Explain.

Ans: Painting Safety Hazards:

Inadequate ventilation: Inadequate ventilation is the first and foremost hazard when painting indoors. It can cause suffocation, Drowsiness, Vomiting etc.

Fire and explosion Hazards: One of the major safety concerns associated with spray application is the combustible, flammable vapours and mists. It is important to ensure that all potential sources of ignition have been removed prior to spraying flammable and combustible products.

Potential sources of ignition include:

- Open flames (work space heating units)
- Cutting and welding torches
- Electrical outlets and lighting
- Static electricity
- Smoking

Health Hazard: The possible health effects of overexposure to these products can vary depending on the chemicals they contain.

The main health effects from exposure to these solvents can include:

- a. Eye and skin irritation
- b. Respiratory tract irritation;
- c. Dermatitis/Skin diseases
- d. Drowsiness
- e. Vomiting

Q17. Explain the working of gear box in brief. What are the advantages of synchromesh gear box over others

Ans: The synchromesh gearbox is a type of manual transmission system in which transmission changes occur between gears rotating at the same speed. Transmissions work on the principle of providing

torque and speed as required. Low gears provide low speeds but high torque, whereas high gears provide high speed but low torque. Torque in an automobile is the force at which the shafts rotate. Another important point to note is the gear ratio, which is given by the ratio driven gear: driver gear. The gear ratio decides the speed at which the meshed gears can produce. For example, if both the gears are of the same size the gear ratio is 1:1. but if the driven gear is double the size of driver gear, it provides a ratio of 2:1. In the case of an automobile gearbox, the driver gear is the input gear linked with the clutch shaft and the driven gear is the output gear linked with the output or main shaft. The counter gears are present just to link the driver and driven gear due to the different sizes of gears present.

In this type of gearbox, the gears on the lay shaft are fixed to it and the gears on the main shaft can either roll freely when disengaged or be locked on the layout shaft when engaged. It is an upgrade on the dog clutch and constant mesh gearbox which were invented earlier.

The difference is that of synchronizing technology used to avoid the clattering or grinding noise during changing of gears due to the difference in speeds of the input shaft and output shaft.

It avoids the need for declutching from the driver. This is based on special shifting devices called synchronizer rings which are used to bring the parts to be engaged into frictional contact which equalizes the speed after which these may be engaged smoothly.

Advantage of using Synchromesh gear box:

- 1) No need of double-declutching as in case of constant mesh gearbox.
- 2) Smooth engagement of higher gears due to the synchromesh device.
- 3) Less noisy as helical gears are used.
- 4) Less vibration.

Q18. Write the Classification of Automobile

Ans: Automobiles can be classified in several ways based on their nature, behaviour, load capacity, design, and more.

Based on the purpose of the vehicle.:

Automobiles are categorized based on the purpose of the vehicle as if an automobile is used for good carrier or passenger carrier or used for any special usage.

For example, we can say the bus, mini-bus, car, etc. falls under the category of passenger carrier. Truck, Pick-up van, trailer, etc. falls under goods carrier, and fire brigade, school bus, police vehicle, ambulance, etc. falls under special usages vehicle.

Based on the load capacity of the vehicle.:

Light-duty vehicles, medium-duty vehicles, and heavy-duty vehicle are falls under this category. Examples of light-duty vehicles such as private cars like Nano, Alto, Scorpio etc. or commercial vehicle like pick-up van, taxi, etc even scooter and motorcycle. Examples of medium-duty vehicles are mini bus, school bus, etc. And the examples of heavy-duty vehicles are Volvo Bus, Truck, Tractor, etc.

Based on the fuel used by the vehicle:

Automobile vehicles can be categorized as the fuel used for vehicles like Petrol, Diesel, Electric, CNG, Solar, and Hybrid vehicles. For example, petrol used as a fuel in general private vehicle like cars, two-wheelers, even light-weight commercial vehicles as well.

Based on the number of wheels the vehicle has:

Automobiles can be classified as the number of wheels an automobile vehicle has, for example: Two Wheeler Vehicle (Motor Cycle, Scooty), Three Wheeler Vehicle (Auto, Toto, etc.), Four Wheeler Vehicle (Cars, Bus, Truck, Tractor, etc.), Six Wheeler vehicle (Bus, Trucks, etc.), Eight Wheeler Vehicle (Bus, Trucks, etc.), Even more than Eight Wheeler Vehicle (Trucks, Trailer, etc.).

Based on the suspension system of the vehicle.:

Based on the suspension system automobile can be classified as follows:

- Independent Suspension System.
- Non-Independent or Rigid Suspension System.
- Air Suspension System.
- Hydro-Electric Suspension System.

Based on the driving end of the vehicle:

If we consider the driving end then an automobile vehicle will be classified into two types:

Right Side Drive (Countries like Belgium, Ethiopia, etc. use right-side drive vehicles.)

Left Side Drive (Countries like India, Bangladesh, Australia, etc. use left-side drive vehicles.)

Based on the transmission system of the vehicle.:

Based on the transmission system automobile classified into three types:

- Manual Transmission System
- Automatic Transmission System
- Semi-automatic and dual-clutch Transmissions System

Based on the body system of the vehicle:

This type of vehicle is categorized as several types such as:

- Two-door sedan (This type of vehicles has two doors, and a sporty look.)
- Hardtop (It has a rigid rooftop, maybe detach or may not).
- Four-door sedan (This type of vehicles has four doors).
- Station wagon (Here the roof of the vehicle is extended rearward).
- Convertible (Can have a roof or no roof).
- Van (It is generally used to transport of goods).

