

**Automobile Engineering
(QUESTION BANK)**

UNIT-I

1. Discuss about the fuel supply system in S.I. engine.
2. Explain about the different types of air filters.
3. Explain about the formation of spray in C.I. engine.
4. Discuss about the chassis and body components in automobile. 5. Explain how a four wheel drive mechanism offers better power transmission in a automobile.
6. Explain with a simple schematic diagram, working of a four wheel drive automobile.
7. Describe in detail about the multipoint fuel injection for S.I. engines.
8. Write about oil pumps and engine service?
9. Write about splash and pressure lubrication systems?
10. Explain how the power can be transmitted in front wheel drive by using a neat diagram?
11. Sketch a chassis of any four wheelers and mark various parts on it. Explain the functions of various components of automobile.
12. How can turbo-charging improve performance of an engine?

UNIT-II

1. What do you mean by the term "Ignition"? How is it related with "combustion"?
2. Sketch and explain different types of Ignition systems used in automotive engines.
3. Why lubrication system is essential in a automobile, explain working of pressurized lubrication system.
4. Explain in detail about the liquid cooling system with a diagram.
5. Discuss about the bendix drive mechanism. 6. Explain why engines should not be sub-cooled.
7. Explain about horn, wiper, fuel gauge and engine temperature indicator?

UNIT-III

1. What are the pollution standards for automobile?
2. Discuss different energy alternatives with their merits and demerits.
3. What are the advantages of using hydrogen as fuel?
4. What are the merits and demerits of biomass?
5. Explain about central locking and electric windows?
6. Write about thermal and catalytic converters?
7. Explain the use of alternative fuels for emission control?
8. Explain the mechanism of pollutants formation?
9. Explain briefly the methods available to control emissions from a automobile.
10. Explain with relevant sketches, working of electric windows in a automobile.
11. Explain Compensated voltage control with the help of a diagram. 12. Name the various electrical components used in an automobile & give their functions?

UNIT-IV

1. Explain with a simple sketch, working of centrifugal type of clutch and why free play should be provided for clutch.
2. Draw and explain with a simple sketch, working of a constant mesh gear box.

3. Describe in detail about single plate clutch with a neat diagram.
4. Explain about the differential rear axle with neat sketch.
5. What are the functions of universal joint and Propeller shaft?
6. Discuss the working principles of i) Torque tube drive. ii) Hotchkiss drive.
7. Explain about sliding mesh and synchro mesh gear boxes with neat diagrams?
8. Explain about magnetic clutch and fluid fly wheel in detail?
9. Write about functions of a propeller shaft and Hotch – Kiss drive?

UNIT-V

1. Explain with a simple sketch, working of worm and ball bearing nut steering mechanism.
2. What are the functions of steering system, explain with relevant sketch Ackerman steering mechanism.
3. Explain with a schematic diagram, working of rigid axle front wheel suspension system.
4. Discuss about the Davis steering mechanism in the automobiles.
5. Describe about the mechanical brake system.
6. Explain the Davis Steering Mechanism? Write its relative merits?
7. Explain about steering geometry in detail?
8. Sketch the arrangement of pneumatic braking system used in automobiles and explain?
9. Explain about the types of steering gears?
10. Describe the cam and roller type of Steering Gear with neat diagram?

AUTOMOBILE ENGINEERING
SHORT ANSWER QUESTIONS
UNIT-I

1. How can turbo-charging improve performance of an engine?

Ans: Turbocharger's tend to be more efficient. Turbo charger is to improve an engine's volumetric efficiency by increasing density of the intake gas (usually air).the turbochargers compressor draws in ambient air and compresses it before it enters into the intake manifold at increased pressure.

2. What is the use of carburetor in S.I. engine?

Ans: Carburetor: is a device which is used in automobiles, with spark ignition engines, for the purpose of fuel metering, i.e. to mix the appropriate amount of fuel with the incoming air which is to be supplied to the engine cylinders. The basic principle upon which the carburetor works is flow of air through the venturi.

3. Explain about the requirements of diesel injection system.

Ans: Requirements of fuel injection system are:

- i. Accurate metering of the fuel injected per cycle: The quantity of the fuel metered should vary to meet changing speed and load requirements of the engine
- ii. Timing the injection of the fuel correctly in the cycle: to obtain maximum power ensuring fuel economy and clean burning.
- iii. Proper control of rate of injection: The desired heat - release pattern is achieved during combustion.
- iv. Proper atomization of fuel into very fine droplets.
- v. Proper spray pattern to ensure rapid mixing of fuel and air.

4. What do you mean by master cylinder?

Ans: master cylinder in British. noun. a large cylinder in a hydraulic system in which the working fluid is compressed by a piston enabling it to drive one or more slave cylinders.

5. What is crank case ventilation?

Ans: Crankcase ventilation system. A crankcase ventilation system (CVS) is a one way passage for the blow-by gases to escape in a controlled manner from the crankcase of an internal combustion engine.

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6. Write the components of four wheeler automobile?

Ans: The automobile can be considered to consist of five basic components : (a) The Engine or Power Plant : It is source of power. (b) The Frame and Chassis : It supports the engine, wheels, body, braking system, steering, etc.

7. Explain why engine service is required?

Ans: A muffler is designed to reduce noise and allow exhaust gases to escape. When it becomes clogged with carbon soot, gases cannot get out of the combustion chamber quickly enough to allow fresh air and fuel to enter. This causes a loss in engine power, along with a tendency to overheat.

8. Write about the types of automobile engines?

Ans: Automotive Engines are generally classified according to following different categories: Internal combustion (IC) and External Combustion (EC) Type of fuel: Petrol, Diesel, Gas, Bio / Alternative Fuels. Number of strokes – Two stroke Petrol, Two-Stroke Diesel, Four Stroke Petrol / Four Stroke Diesel.

9. Explain about oil filters?

Ans: An oil filter is a filter designed to remove contaminants from engine oil, transmission oil, lubricating oil, or hydraulic oil. A chief use of the oil filter is in internal-combustion engines in on- and off-road motor vehicles, light aircraft, and various naval vessels.

10. Explain about nitriding of crank shaft?

Ans: Nitriding is a process to harden the surface of a metal component. Lycoming made a capital investment to implement an ion nitriding process for crank shaft surface hardening, enabling Lycoming to significantly reduce environmental impacts from the previous process.

UNIT-II

1. What are the components of water cooling system?

1. Radiator 2. Pressure cap and expansion reservoir 3. Thermostat 4. Pump 5. Fan

2. What is the function of radiator? What are the types of radiators?

The function of radiator is to ensure close contact of the hot coolant coming out of the engine with outside air, so as to ensure high rates of heat transfer from the coolant air.

The types are
Tubular and cellular.

3. What is thermostat? What are the two types of thermostat?

A thermostat simply switches the cooling system on and off as necessary. It works by sensing the water temperature, switching on the heating when the water temperature falls below the thermostat setting, and switching it off once this set temperature has been reached. The two types are Bellows type and Wax type.

4. What is anti freeze solutions?

Antifreeze is an additive which lowers the freezing point of a water-based liquid and increases its boiling point. An antifreeze mixture is used to achieve freezing-point depression for cold environments and also achieves boiling-point elevation ("anti-boil") to allow higher coolant temperature.

5. What are the requirements of a good ignition system?
 1. Spark at the plug electrode must be regular and synchronously times w.r.t the cylinder piston position at all speeds and loads on the engine.
 2. The spark should be sufficiently strong so as to ignition of the charge.
 3. The spark duration should be sufficient to establish burning of the air-fuel mixture under all conditions.
 4. The power consumed to produce spark should be minimum
6. What are the components of battery ignition system?
 1. Battery 2. Ignition coil 3. Contact breaker 4. Condenser 5. Distributor 6. Spark Plug
7. What is pulse generator?

A pulse generator is used to generate an alternating voltage, which is used instead of contact breaker points to control the make and break of the current build-up on the primary winding of the ignition coil.
8. What is ignition coil?

Ignition coil is simply a transformer with certain characteristic making it suitable for its special use but impairing to some extent its efficiency as a transformer.
9. What is condenser?

Condenser is connected across the contact breaker. It may be considered as a kind of elastic container in which the energy due to the inertia of the current flowing during the contact period stored.
10. What are the requirements of spark plug?
 1. Very high resistance to leakage
 2. Continued maintenance of proper gap under all conditions
 3. Gas tightness
 4. Good resistance to corrosion

UNIT-III

1. What are the pollution standards in national and International level?

India – Bharat Stage Emission
 USA – Environmental Protection Agency
 European countries – Euro standards
 CANADA - Canadian Environmental Protection Act
 China - Energy policy of China
2. What is the major pollution control technique in IC engines?

Three- Way catalysts are the main auto catalyst technology used to control emission from gasoline engines. The catalyst uses a ceramic or metallic substrate with an active coating incorporating alumina, ceria and other oxides and combination of the precious metals- platinum, palladium and rhodium.
3. What are the alternative energy alternatives for IC engines?

Solar PV cells, Hydrogen, biomass, alcohols, LPG, CNG liquid fuels and gaseous fuels
4. What is voltage regulator?

It consists of a series winding and a shunt winding, both wound on a single core. The series winding is made of a few turns of thick wire and one end of this connected to the field terminal of the regulator while the other end is grounded via the contact points.

5. Define cut out relay.
When the generator speed is very low, due to which the output is not sufficient to balance the battery voltage, the necessity to cut out the generator from the battery arises, because otherwise the battery would discharge into the generator.
6. What is Bendix drive mechanism?
Bendix drives are the inertia drives in which the starter motor pinion is made to engage or disengage with the toothed ring on the periphery of the engine flywheel.
7. Name some lighting switching systems.
1. Light switch 2. Dimmer switch 3. Stop light switch
8. What is Speedo meter?
It is an instrument on a vehicle's dashboard indicating its speed.
9. What is odometer?
It is an instrument for measuring the distance travelled by a wheeled vehicle. The *odometer* is usually situated in the vehicle's dashboard
10. What is windscreen wiper?
A windscreen wiper or windshield wiper is a device used to remove rain, snow, ice and debris from a windscreen or windshield.

UNIT-IV

1. Why it is important to maintain tyre pressure?

Ans: Accurate **tyre pressure** is very **important** to reduce the risk of hazard. Because, inflated **tires** lead to decline fuel efficiency and lead to increase the **tyre** rolling resistance. That's way, car needs more energy to move and consume more fuel than the normal car consumption.

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2. What are the functions of clutch?

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Ans: Function of the Clutch. Function of transmitting the torque from the engine to the

drive train. Smoothly deliver the **power** from the engine to enable smooth vehicle movement. Perform quietly and to reduce drive-related vibration.

3. What is the necessity of transmission system?

Ans: The basic function of the transmission system is to control the torque and speed that's sent forward to the wheels from the engine. So in effect, its purpose is to provide a level of flexibility to you and make engine's power & torque more useable.

4. What is the function of fluid flywheel?

Ans: A fluid coupling or hydraulic coupling is a hydrodynamic or 'hydrokinetic' device used to transmit rotating mechanical power. It has been used in automobile transmissions as an alternative to a mechanical clutch.

5. What is the function of differential?

Ans: The main function of the differential is that it helps the vehicle take turns. The differential system allows the two wheels of the rear axle (or any powered axle) to rotate with respect to each other while transferring the power from the propeller shaft to both of them.

6. What is the function of universal joint?

Ans: In RWD vehicles, to transmit power from engine to differential, two universal joints are used (one at each end). Since it helps in torque transmission between shafts are varying angles, it's called a positive mechanical joint. A universal joint has three basic parts- two yokes and a cross.

7. Explain the principle of clutches.

Ans: Clutch works on the principle of friction because when the two rough surface clutch plates are comes in contact with each other then they become rotating as a single unit. This is possible due to the friction between the two plates.

8. How gear box is important for an automobile?

Ans: The ultimate function of gear box is to provide different output speeds with input speed. It is done by different calculations including gear ratios and other gear design formulae. In a car, that would be the main shaft in the engine to the drive shaft that puts power to the wheels.

9. What are the disadvantages of constant mesh gear box?

- Ans:** 1. Lower efficiency as compared with sliding mesh type.
 2. More expensive as additional dog clutch have is being used.
 3. Working is bit complicated.

10. What is the difference between Hotch Kiss drive and Torque tube drive?

Ans: Hotch kiss drive- 1. Simplest and most used type of rear axle 2. Take the torque reaction, driving thrust, side thrust 3. Propeller shaft provided with two universal joints 4. Leaf spring one end connected at frame and other one at shackle

Torque tube drive - 1. Spring takes only side thrust beside supporting the body weight 2. Torque reaction, braking torque, driving thrust taking by torque tube drive 3. One end connected with cup and other one at rear axle(no use of universal joints).

UNIT-V

1. What is mean by centre point steering?

Ans: Centre point Steering basically follows the principle of Ackermann Steering Geometry. The intention of Ackermann geometry is to avoid the need for tyres to slip sideways when following the path around a curve.

2. Why the shock absorbers are used in automobile?

Ans: Shock absorbers serve the purpose of limiting excessive suspension movement, their intended sole purpose is to damp spring oscillations. Shock absorbers use valving of oil and gasses to absorb excess energy from the springs. Vehicles typically employ both hydraulic shock absorbers and springs or torsion bars.

3. What is the purpose of independent suspension system in automobiles?

Ans: Independent suspension is a broad term for any automobile suspension system that allows each wheel on the same axle to move vertically (i.e. reacting to a bump in the road) independently of the others. Most modern vehicles have independent front suspension (IFS).

4. What are the objectives of suspension system?

- Ans:** 1. Reduce the effect of shock forces.
 2. Maintain correct wheel alignment.
 3. Support vehicle weight.
 4. Keep the tyres in contact with the road.
 5. Control the vehicle's direction of travel.

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5. Why Hydraulic brakes are not used in commercial vehicles? of Mechanical Engineering

Ans: Air brakes are used as an alternative to hydraulic brakes which are used on

lighter vehicles such as automobiles. Hydraulic brakes use a liquid (hydraulic fluid) to transfer pressure from the brake pedal to the brake shoe to stop the vehicle. Air brakes are used in heavy commercial vehicles due to their reliability.

6. What are the requirements of brake fluid?

Ans: 1. Boiling point of fluid should be high
 2. Viscosity of fluid should vary a little with temperature
 3. It should provide suitable lubrication to the components.
 4. It should not have any effect on seals.
 5. It should not corrode the metal components.

7. What is the role of Master cylinder in hydraulic brake system?

Ans: The master cylinder, also known as the master brake cylinder, converts the pressure on the brake pedal to hydraulic pressure by feeding brake fluid into the brake circuit and controlling this according to the mechanical force. Master brake cylinders are used both in disc brakes and drum brakes.

8. What is meant by Camber, Castor and Kingpin rake?

Ans: camber: Camber angle is the angle made by the wheels of a vehicle; specifically, it is the angle between the vertical axis of the wheels used for steering and the vertical axis of the vehicle when viewed from the front or rear. It is used in the design of steering and suspension.

Castor: Caster is the angle of the steering axis from the vertical as viewed from the side. Positive caster is defined as the steering axis inclined toward the rear of the vehicle. Camber is the angle of the tire/wheel with respect to the vertical as viewed from the front of the vehicle

9. What is meant by combined angle and Toe-in & Toe-out?

Ans: Toe-in describes the setting of a pair of wheels on an axle in which the edge of each wheel is inclined slightly inward. If a car has toe-in, it means that the front edges of the wheels are closer to each other than the rear edges.

Toe in/toe out is related to tire or wheel geometry and tells you how much the wheels are turned around the vertical axis, when pointed straight-on (so as they are in the rear and with the steering wheel in the middle in front).

10. How pneumatic brakes are different from hydraulic brakes?

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Ans: Hydraulic brake systems are used as the main braking system on almost all passenger vehicles and light trucks. Hydraulic brakes use brake fluid to transmit force

when the brakes are applied. Air brake systems use compressed air, which is stored in tanks, to produce the force that applies the brakes at each wheel.

AUTOMOBILE ENGINEERING

CASE STUDY

UNIT I

1. Prepare a poster for components of a four wheeler Automobile.
2. Show the difference between 2 wheel drive and 4 wheel drive in a table form in a poster.
3. Show the carburettor with neat sketches.
4. Prepare a video of splash and pressure lubrication systems.
5. Play a video/animation for diesel fuel injector.

UNIT II

6. Demonstrate the working principle of a radiator with a help of a model.
7. Make a poster that containing types of radiators.
8. Prepare a poster for various ignition systems.
9. Do a project with a help of thermostat that cutoff and on at a specified temperature.

UNIT III

10. Study on Bharat IV and Bharat V emission standards and highlight the differences.
11. What are the energy alternatives? Give a brief study in a form of poster.
12. Conduct a small experiment on solenoid switch.
13. Fabricate a wiper and demonstrate it.

UNIT IV

14. Prepare a video for various types and working of clutches.
15. Prepare a video for fluid fly wheel.
16. Prepare a poster for gear box with 1st, 2nd, 3rd, Top gear and rear gear positioning.
17. Prepare a working model (with the help of steel bars) which describes Hotch-kiss drive.
18. Demonstrate the construction of tyre using a cut section model.
19. Prepare a poster that indicates working of differential.

UNIT IV

20. Make a video showing various suspension systems.
21. Make a video showing braking systems.
22. Show steering geometry in the form of poster.
23. Do a project for Ackerman steering mechanism.
24. Do a project for Davis steering mechanism.