



**Akhil Bharatiya Maratha Shikshan Parishad's
Anantrao Pawar College of Engineering & Research**



Record No.: *ADM/D/03cB*

DoI: 02/01/2023

Revision: 00

Internal Correspondence

Course: **B. Voc**

Class: **Second Year**

Branch: **Automobile Servicing**

Subject: **Automobile Engine System-I**

Semester: **3**

Unit No: 3, 4 & 5

Multiple Choice Questions

1. What is a split skirt piston primarily designed to reduce?				
A. Engine weight	B. Piston slap	C. Oil consumption	D. Fuel injection pressure	Answer: Option B
2. Anodizing of a piston primarily serves to:				
A. Increase wear resistance	B. Improve electrical conductivity	C. Reduce weight	D. Enhance thermal conductivity	Answer: Option A
3. Cam-ground pistons are designed to:				
A. Increase lubrication	B. Minimize piston-cylinder friction	C. Provide a tighter fit when cold and expand to fit when hot	D. Reduce engine vibration	Answer: Option C
4. What is the primary function of piston rings in an engine?				
A. To increase the engine's compression ratio	B. To prevent oil from entering the combustion chamber	C. To transfer heat from the piston to the cylinder wall	D. Both B and C	Answer: Option D
5. How many piston rings are typically found on a conventional piston in an internal combustion engine?				
A. 1	B. 2	C. 3	D. 4	Answer: Option C
6. What is the primary function of a piston pin (also known as a gudgeon pin) in an internal combustion engine?				
A. To connect the piston to the cylinder head	B. To connect the piston to the connecting rod	C. To secure the piston rings	D. To balance the engine weight	Answer: Option B
7. The piston pin is typically subjected to:				
A. Axial loads only	B. Tensile loads only	C. Both tensile and shear loads	D. Only compressive loads	Answer: Option C



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8. What is the main function of engine valves in an internal combustion engine?

A. To ignite the air-fuel mixture	B. To control the intake and exhaust of gases	C. To lubricate the cylinder walls	D. To reduce engine noise	Answer: Option B
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9. Which of the following valves is most commonly used in internal combustion engines?

A. Reed valve	B. Rotary valve	C. Poppet valve	D. Butterfly valve	Answer: Option C
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10. The primary function of a connecting rod in an internal combustion engine is to:

A. Drive the camshaft	B. Transfer motion from the piston to the crankshaft	C. Maintain the alignment of the engine valves	D. Control the timing of the ignition system	Answer: Option B
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11. The two ends of a connecting rod are known as:

A. Piston end and valve end	B. Big end and small end	C. Lower end and upper end	D. Crank end and cam end	Answer: Option B
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12. The cross-section of a connecting rod is typically designed as:

A. Circular	B. Rectangular	C. I-section	D. Hollow cylindrical	Answer: Option C
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13. The crankshaft is typically located:

A. In the cylinder head	B. Below the pistons, within the engine block	C. Above the camshaft	D. In the fuel injection system	Answer: Option B
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14. Which component of the crankshaft connects directly to the connecting rods?

A. Main journal	B. Crank pin or rod journal	C. Counterweight	D. Flywheel	Answer: Option B
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15. The camshaft is driven by:

A. The alternator	B. The crankshaft	C. The oil pump	D. The carburetor	Answer: Option B
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16. The primary function of the inlet manifold is to:

A. Expel exhaust gases from the engine	B. Increase the temperature of the exhaust gases	C. Reduce engine noise	D. Distribute the air-fuel mixture evenly to the engine cylinders	Answer: Option D
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17. The purpose of timing gears in an engine is to:

A. Regulate the air-fuel mixture	B. Adjust the engine's compression ratio	C. Increase the engine's power output	D. Ensure proper synchronization between the camshaft and the crankshaft	Answer: Option D
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18. Which material is commonly used for manufacturing exhaust manifolds?

A. Plastic	B. Aluminum alloy	C. Cast iron or stainless steel	D. Rubber	Answer: Option C
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19. What is the main purpose of Variable Valve Timing (VVT) in an engine?

A. To optimize engine performance and efficiency at different speeds	B. To control the fuel injection timing	C. To increase engine noise	D. To regulate the cooling system	Answer: Option A
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20. Which of the following is a popular VVT system used by Toyota?

A. VTEC	B. VVT-i (Variable Valve Timing with intelligence)	C. MIVEC	D. i-VTEC	Answer: Option B
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21. The basic principle of a rotary engine is:

A. The engine uses a reciprocating motion of pistons	B. The engine uses a turbocharger to boost performance	C. The engine operates with a V-shaped configuration	D. The engine uses a rotating triangular rotor inside an oval chamber	Answer: Option D
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22. The basic principle of an internal combustion turbine is:

A. Fuel is burned outside the turbine to generate power	B. Fuel is burned inside the turbine to generate heat and power	C. The turbine operates by the expansion of compressed air	D. The turbine generates power through external steam pressure	Answer: Option B
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23. The rotary engine is also known as:

A. Wankel engine	B. V6 engine	C. Diesel engine	D. Opposed piston engine	Answer: Option A
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24. Internal combustion turbines can be classified based on:

A. Type of fuel used	B. Application of the turbine	C. Method of cooling	D. All of the above	Answer: Option D
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25. The primary function of the combustion chamber in an internal combustion engine is to:

A. Store the fuel before it enters the cylinder	B. Mix fuel and air for combustion	C. Convert thermal energy into mechanical energy	D. Regulate the exhaust gases' flow	Answer: Option B
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26. Supercharging in an internal combustion engine refers to:

A. The use of exhaust gases to drive the intake air compressor	B. The cooling of intake air before combustion	C. The use of a turbocharger to boost engine performance	D. Increasing the intake air pressure to increase engine power	Answer: Option D
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27. The necessity of supercharging in an engine is to:

A. Increase engine size for more power output	B. Improve fuel efficiency at low speeds	C. Increase the amount of air intake to improve combustion and boost power	D. Reduce the amount of exhaust gases produced during operation	Answer: Option C
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28. The engine specification of a typical Indian four-wheeler like the Maruti Suzuki Swift includes:

A. 1.0L, 2-cylinder, electric engine	B. 1.2L, 4-cylinder, petrol engine with 83 bhp	C. 1.5L, 6-cylinder, diesel engine	D. 1.8L, 8-cylinder, turbocharged engine	Answer: Option B
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29. The engine specification of a typical Indian three-wheeler like the Bajaj Auto RE includes:

A. 0.2L, 1-cylinder, petrol engine	B. 0.5L, 1-cylinder, diesel engine	C. 1.0L, 2-cylinder, electric engine	D. 0.2L, 1-cylinder, CNG engine	Answer: Option D
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30. The engine specification of a typical Indian two-wheeler like the Hero Splendor Plus includes:

A. 0.1L, 2-stroke engine	B. 0.9L, 4-stroke, single-cylinder, petrol engine	C. 0.2L, 4-stroke, single-cylinder, petrol engine	D. 1.5L, 4-cylinder, turbocharged engine	Answer: Option C
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Short Answer Questions

Question No	Question	Marks
1	<p>What is a connecting rod, and what is its primary function in an internal combustion engine? Describe the common cross-sectional design of a connecting rod and explain why this design is used.</p> <p>Answer :</p> <ul style="list-style-type: none"> • A connecting rod is a crucial component of an internal combustion engine that links the piston to the crankshaft. Its primary function is to convert the reciprocating motion of the piston into the rotational motion of the crankshaft. The connecting rod transmits the force generated from the combustion of fuel in the cylinder to the crankshaft, making it a vital element for engine power transmission. • The connecting rod typically has an I-section cross-sectional design. This design is chosen because it provides a high strength-to-weight ratio, meaning it offers maximum strength while keeping the weight minimal. The I-section is highly effective in reducing bending stress and offers significant rigidity, which is essential to withstand the forces generated during the engine's operation. This design helps in reducing the overall inertia of the engine, improving efficiency and performance. 	4



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Internal Correspondence

2	<p>What is a crankshaft, and what role does it play in an internal combustion engine? Explain the difference between a left-hand and a right-hand crankshaft.</p> <p>Answer :</p> <ul style="list-style-type: none">• A crankshaft is a mechanical component in an internal combustion engine that converts the reciprocating motion of the pistons into rotational motion, which ultimately drives the wheels or other connected machinery. The crankshaft consists of crankpins and crank throws, which are connected to the pistons via connecting rods. It is designed to withstand high levels of torsional and bending stress while maintaining engine balance and smooth operation.• The terms left-hand and right-hand crankshaft refer to the direction in which the crankshaft rotates when viewed from the front of the engine.<ul style="list-style-type: none">➤ A left-hand crankshaft rotates counter clockwise, which is typically used in certain marine or specialty engines.➤ A right-hand crankshaft rotates clockwise, which is more common in most automotive engines. These designations are important for engine configuration and compatibility with other engine components, as the direction of rotation affects the functioning of the timing mechanism and accessories.	4
3	<p>Explain the working principle and operation of a rotary engine.</p> <p>Answers:</p> <p>The principle of a rotary engine is based on the Wankel design, where a triangular rotor rotates within a chamber, creating three separate volumes that cycle through the four stages of combustion:</p> <ul style="list-style-type: none">• Intake: The intake port opens, allowing the air-fuel mixture to enter as the rotor's chamber volume increases.• Compression: The rotor continues turning, compressing the air-fuel mixture as the volume decreases.• Power: A spark plug ignites the compressed mixture, causing an explosion that drives the rotor forward, producing power.• Exhaust: The exhaust port opens, expelling the burnt gases as the rotor turns and the volume decreases again. This continuous rotary motion results in smooth power delivery and a compact engine design.	4
4	<p>What are the advantages of a rotary engine compared to a traditional piston engine?</p> <p>Answer :</p> <p>A rotary engine has several advantages:</p> <ul style="list-style-type: none">• Compact and Lightweight: The design is simpler and more compact, with fewer moving parts, resulting in a lighter engine.• Smooth Operation: The continuous rotary motion reduces vibrations and provides smoother power delivery.• High Power-to-Weight Ratio: Rotary engines can produce a significant amount of power relative to their size and weight, making them suitable for sports cars and aircraft.• Simple Construction: With fewer components, the engine is easier to manufacture and maintain.	4



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5	<p>Describe the methods of scavenging used in two-stroke engines.</p> <p>Answer :</p> <p>The scavenging process in two-stroke engines can be classified into three main types:</p> <ul style="list-style-type: none">• Cross-Flow Scavenging: In this method, the incoming air-fuel mixture enters on one side of the cylinder and pushes the exhaust gases out through the opposite side. It is typically used in engines with a deflector on the piston crown to direct the flow of gases. However, it is not very efficient and often leads to incomplete scavenging.• Loop Scavenging: Here, the incoming charge is directed upwards and loops around the cylinder, pushing the exhaust gases out through an exhaust port on the same side. This method provides better scavenging efficiency and is commonly used in modern two-stroke engines.• Uniflow Scavenging: The fresh charge enters from one end of the cylinder (usually through ports near the bottom) and pushes the exhaust gases out through a valve at the top. This is the most efficient scavenging method and is used in large marine and industrial engines.	4
6	<p>How do engine specifications affect the performance and efficiency of vehicles in different categories?</p> <p>Answer :</p> <p>Engine specifications significantly influence the performance, fuel efficiency, and overall driving experience of vehicles:</p> <ul style="list-style-type: none">• Four-Wheelers: Engines with larger displacements and higher power outputs provide better performance and acceleration but may reduce fuel efficiency. Smaller engines, especially those with turbochargers, offer a balance between power and efficiency.• Three-Wheelers: These vehicles prioritize fuel efficiency and low maintenance costs. Engines are tuned to deliver adequate torque for carrying loads and navigating city traffic, but high-speed performance is limited.• Two-Wheelers: Commuter bikes and scooters have smaller engines optimized for fuel efficiency and ease of use in urban settings. High-performance motorcycles have larger engines designed for speed and acceleration but consume more fuel.	4
7	<p>What is valve clearance, and why is it important?</p> <p>Answer :</p> <p>Valve clearance is the small gap between the valve stem and the rocker arm or camshaft when the valve is fully closed. It is important because it allows for thermal expansion of the valve components and ensures proper valve operation. Incorrect valve clearance can lead to engine performance issues, valve damage, or increased wear.</p>	2
8	<p>What is a hydraulic tappet, and what advantage does it offer in engine operation?</p> <p>Answer :</p> <p>A hydraulic tappet is a component in the valve train that automatically adjusts valve clearance using engine oil pressure. It maintains zero clearance, reducing valve noise and wear while ensuring optimal valve timing and performance without the need for manual adjustment.</p>	2
9	<p>What are sodium-cooled valves, and where are they used?</p> <p>Answer :</p> <p>Sodium-cooled valves are exhaust valves filled with sodium to improve heat dissipation. The sodium melts at high temperatures and circulates within the valve stem, carrying heat from the valve head to the stem, where it can be transferred to the cylinder head.</p>	2



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	These valves are commonly used in high-performance and heavy-duty engines to handle extreme temperatures.	
10	What are valve seat inserts, and why are they used? Answer : Valve seat inserts are hardened metal rings fitted into the cylinder head around the valve openings. They provide a durable seating surface for the valves, especially in engines using unleaded fuel. Valve seat inserts help improve valve life and maintain proper compression and sealing in the combustion chamber.	2
11	What are piston rings, and what are the different types used in an engine? Answer : The different types of piston rings are: <ul style="list-style-type: none">• Compression Rings: Seal the combustion chamber, preventing gas leakage.• Oil Control Rings: Regulate the amount of oil on the cylinder wall, preventing excess oil from entering the combustion chamber.• Scraper Rings: Remove excess oil from the cylinder walls, improving lubrication efficiency.	2
12	What is the principle of working of an internal combustion turbine? Answer : An internal combustion turbine, or gas turbine, operates on the principle of continuous combustion. Compressed air is mixed with fuel and ignited in a combustion chamber. The resulting high-temperature, high-pressure gases expand through the turbine blades, producing mechanical energy that drives a generator or propulsion system. This setup is characterized by a steady flow of energy conversion.	2
13	How are internal combustion turbines classified? Answer : Internal combustion turbines are classified into different types based on their design and applications: <ul style="list-style-type: none">• Axial Flow Turbines: Used in power generation and aircraft engines, featuring high efficiency.• Radial Flow Turbines: Compact and used for smaller applications.• Turbojets, Turbofans, and Turboprops: Used in aviation, differing in thrust and fuel efficiency.	2
14	Explain the Brayton cycle and its importance in gas turbines. Answer : The Brayton cycle describes the thermodynamic processes in a gas turbine: isentropic compression, constant pressure combustion, isentropic expansion, and heat rejection. It illustrates how energy is converted from fuel to mechanical work. The cycle's efficiency depends on the temperature and pressure ratios, providing a basis for designing and improving gas turbines.	2



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15	<p>What factors affect the cycle efficiency of a gas turbine? Answer : Cycle efficiency is influenced by the compression ratio, turbine inlet temperature, and component losses. Higher compression ratios and inlet temperatures increase efficiency but pose material challenges. Irreversible losses like friction, heat dissipation, and non-ideal gas behavior also reduce actual efficiency compared to theoretical predictions.</p>	2
16	<p>How does friction impact the performance of a gas turbine? Answer : Friction within the compressor and turbine stages causes energy losses, reducing the turbine's mechanical efficiency. It increases fuel consumption and results in lower output power. Additionally, friction generates heat, which must be managed to prevent component degradation, impacting overall turbine performance.</p>	2
17	<p>What is supercharging, and why is it necessary in engines? Answer : Supercharging is the process of increasing the pressure and density of air entering the engine using a compressor. It is necessary to improve engine power output and efficiency, especially at higher altitudes or in performance applications. Supercharging enhances combustion by providing more oxygen, leading to increased power generation without increasing engine size.</p>	2
18	<p>What are the different types of rotary compressors used in super-charging? Answer : The main types of rotary compressors used in supercharging are Roots blowers, screw compressors, and centrifugal compressors. Roots blowers provide constant pressure but are less efficient, while screw compressors offer better efficiency. Centrifugal compressors are widely used in turbochargers for their high-speed and lightweight characteristics.</p>	2
19	<p>What is the function of a turbocharger, and why is it required? Answer : A turbocharger uses exhaust gas energy to drive a turbine, which powers a compressor to increase air intake pressure. It is required to improve engine efficiency and power output by recycling energy from exhaust gases. This process enhances overall fuel economy and reduces emissions while maintaining engine performance.</p>	2
20	<p>How does supercharging affect the power output of an engine? Answer : Supercharging increases the engine's power output by allowing more air (and fuel) to be burned in each cycle, improving combustion efficiency. This results in higher torque and horsepower. However, increased pressure can also stress engine components, requiring design modifications to handle the added load.</p>	2



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<p>21</p>	<p>What impact does supercharging have on mechanical losses in an engine? Answer : Supercharging increases mechanical losses due to the added load on the engine's components, especially if a belt-driven supercharger is used. The engine must work harder to drive the compressor, leading to additional friction and wear. Nonetheless, the overall power gain usually outweighs these losses, depending on the supercharger design.</p>	<p>2</p>
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