1. What is the primary difference between a Spark Ignition (SI) engine and a Compression Ignition (CI) engine?

a) Fuel injection mechanism
b) Ignition timing
c) Ignition source
d) Compression ratio

Answer: c) Ignition source

Explanation: In a Spark Ignition (SI) engine, the air-fuel mixture is ignited by a spark plug, whereas in a Compression Ignition (CI) engine, ignition occurs solely due to the high temperature generated by compressing the air-fuel mixture.

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2. Which engine cycle involves intake, compression, power, and exhaust strokes to complete one operating cycle?

a) Otto cycle
b) Diesel cycle
c) Brayton cycle
d) Rankine cycle

Answer: a) Otto cycle

Explanation: The Otto cycle, used in Spark Ignition (SI) engines, consists of four strokes:

intake, compression, power, and exhaust, completing one operating cycle.

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3. What determines the volumetric efficiency of an internal combustion engine?

a) Compression ratio
b) Engine speed
c) Cylinder arrangement
d) Intake system design

Answer: d) Intake system design

Explanation: Volumetric efficiency is influenced by factors such as intake system design, including the design of intake manifolds, valves, and ports, affecting the engine's ability to draw in air-fuel mixture efficiently.

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4. Which factor has the most significant impact on the mean effective pressure in an internal combustion engine?

a) Engine displacement
b) Fuel octane rating
c) Ignition timing
d) Brake Mean Effective Pressure (BMEP)

Answer: d) Brake Mean Effective Pressure (BMEP)

Explanation: BMEP is a measure of the average pressure exerted on the piston during the power stroke and is a key indicator of an engine's efficiency and performance.

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5. In a multi-cylinder engine, what is the purpose of the firing order?

a) Determine fuel injection timing
b) Regulate air-fuel mixture ratio
c) Control exhaust valve timing
d) Sequence of ignition events

Answer: d) Sequence of ignition events

Explanation: The firing order specifies the sequence in which each cylinder in a multi-cylinder engine undergoes the power stroke, ensuring smooth operation and balanced power delivery.

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6. What is the primary factor affecting the fuel consumption of an internal combustion engine?

a) Engine speed
b) Engine temperature

c) Air-fuel ratio
d) Compression ratio

Answer: c) Air-fuel ratio

Explanation: The air-fuel ratio determines the amount of fuel burned for a given amount of air, directly impacting fuel consumption and engine efficiency.

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7. Which type of engine exhibits higher thermal efficiency: SI or CI engine?

a) SI engine
b) CI engine
c) Both have similar thermal efficiency
d) Depends on operating conditions

Answer: b) CI engine

Explanation: Compression Ignition (CI) engines typically exhibit higher thermal efficiency due to their higher compression ratios and leaner air-fuel mixtures.

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8. What is the primary purpose of a heat balance analysis in an internal combustion engine?

a) Determine fuel octane rating
b) Assess engine cooling system effectiveness
c) Evaluate energy losses and heat transfer
d) Optimize ignition timing

Answer: c) Evaluate energy losses and heat transfer

Explanation: Heat balance analysis helps to quantify the distribution of heat within the engine, identifying areas of energy loss and optimizing efficiency.

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9. Which factor is crucial in determining the power balance among cylinders in a multi-cylinder engine?

a) Cylinder arrangement
b) Firing order
c) Engine displacement
d) Compression ratio

Answer: b) Firing order

Explanation: Firing order ensures balanced power delivery among cylinders, minimizing vibration and maximizing engine smoothness and efficiency.

10. What effect does engine speed have on the performance characteristics of an internal combustion engine?

a) Increases fuel efficiency
b) Decreases power output
c) Affects torque curve
d) Improves volumetric efficiency

Answer: c) Affects torque curve

Explanation: Engine speed influences the shape and position of the torque curve, impacting the engine's performance characteristics, such as power output and acceleration.

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