
Q622 - Gas Turbine Plants

1. Compared to other types of engines, what is the biggest advantage of a gas turbine engine?

- Simplicity of installation
- Simplicity of the control circuits
- Low power-to-weight ratio
- **Highest power-to-weight ratio**

Note:
Gas turbine engines offer the highest power-to-weight ratio compared to other engine types, delivering significant power with minimal weight.

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2. Which of the following terms refers to axial compressor stator blades?

- Roots
- Nozzles
- Shrouds
- **Vanes**

Note:
Axial compressor stator blades are correctly termed vanes, which direct airflow between rotating blade rows. Rotor blades are the moving components, while shrouds support blade tips and nozzles direct gas flow in turbines or exhaust systems. The blade root is the attachment point to the disk, not the stator blade itself.

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3. Which of the following conditions permits a gas turbine to produce 100% power?

- Maximum fuel flow
- **Minimum air inlet temperature**
- Maximum combustion temperature
- Minimum air mass/weight flow

Note:
Minimum air inlet temperature increases air density, allowing for greater air mass flow and fuel combustion without exceeding temperature limits, enabling the gas turbine to reach 100% power.

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4. How do the high-velocity high-temperature gases cause the gas turbine rotor to rotate?

- By increasing the velocity of the gases.
- By creating a low-pressure area before the rotor.
- **By transferring velocity energy and thermal energy to the turbine blades.**
- By converting the high-velocity gas to low-velocity gas.

Note:
The gas turbine rotor rotates due to the transfer of velocity and thermal energy from the high-velocity, high-temperature gases to the turbine blades, generating a force that drives the rotation.

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5. In a gas turbine, the air charge is permitted to be compressed adiabatically by what factor, process, or condition?

- Low-compression ratio
- **Speed of the process**
- Rapid heat transfer
- Interstage cooling

Note:
Adiabatic compression occurs rapidly, minimizing heat transfer. Therefore, the speed of the process is the condition that permits adiabatic compression in a gas turbine.

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6. The Brayton Cycle is a series of events best described by which of the following statements?

- Intake, pressurization, ignition, exhaust
- Intake, decompression, combustion, expansion, exhaust
- **Intake, compression, combustion, expansion, exhaust**
- Intake, compression, combustion, explosion, exhaust

Note:
The Brayton cycle describes a gas turbine process involving intake, compression, combustion, expansion, and exhaust. This sequence accurately represents the thermodynamic cycle used in gas turbine engines, where air is compressed, fuel is burned, hot gases expand to produce work, and then are exhausted.

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7. A gas turbine engine in which exhaust gas heat energy is added to the air charge between the compressor and combustion chamber is classified as which of the following?

- **Regenerative cycle engine**
- Closed cycle engine
- Semi-open cycle engine
- Open cycle engine

Note:
A regenerative cycle engine utilizes a heat exchanger to transfer exhaust gas heat to the air charge before combustion, as described in the question. This process recovers waste heat, reducing fuel consumption, and distinguishes it from open, closed, or semi-open cycle engines, which do not incorporate this heat recovery mechanism.

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8. Which of the following is an advantage of a single-shaft gas turbine engine compared to a split-shaft gas turbine engine?

- Reversible
- **Fewer moving parts**
- Lower starting torque
- Better fuel economy

Note:
Single-shaft gas turbines have fewer moving parts than split-shaft engines because they combine the compressor and power turbine on a single shaft, eliminating the additional shafts and components found in split-shaft designs.

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9. What type of air seal is used in the sump and turbine areas of a gas turbine engine?

- Pneumatic carbon ring
- Fishmouth
- Lip-type
- **Labyrinth-Honeycomb**

Note:
Labyrinth-honeycomb seals are the standard air seal for gas turbine sump and turbine areas, minimizing leakage through multiple pressure drops with minimal mechanical contact.

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10. What type of air seal is used in the combustor and turbine midframe of a gas turbine?

- Pneumatic carbon ring
- **Fishmouth**
- Labyrinth-Honeycomb
- Lip-type

Note:
Fishmouth seals are used in the combustor and turbine midframe due to their flexible metal tabs, which maintain an effective air seal while accommodating thermal expansion and rotor movement in this high-temperature environment. Other seal types are unsuitable for the extreme heat and movement present in this location.
