

Basic Engineering Common Core (BECC) 6 Practice Test (Sample)

Study Guide



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Questions

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- 1. What test indicates whether any unintended valves are open, allowing fuel to accumulate improperly?**
 - A. Pressure Test**
 - B. Integrity Test**
 - C. Flow Test**
 - D. Leak Detection Test**
- 2. What is the number of fuel nozzles on the LM2500?**
 - A. 20**
 - B. 25**
 - C. 30**
 - D. 35**
- 3. What system removes accumulated water and sediment from the bottoms of fuel tanks?**
 - A. Fuel Filtration System**
 - B. Fuel Stripping System**
 - C. Water Separation System**
 - D. Fuel Purification System**
- 4. What anchors the blades and transmits their force to the shaft?**
 - A. Rotor**
 - B. Steam drum**
 - C. Diffusers**
 - D. Economizer**
- 5. In a four-stroke Diesel engine, during which stroke is fuel injected into the cylinder?**
 - A. Intake**
 - B. Combustion**
 - C. Power**
 - D. Compression**

- 6. Which aspect does the oil water separator focus on during operation?**
- A. Oil filtration**
 - B. Separation of liquid types**
 - C. Temperature control**
 - D. Pressure regulation**
- 7. What is the main purpose of a steam drum in a boiler system?**
- A. Store and separate steam from water**
 - B. Preheat feedwater**
 - C. Reduce pressure**
 - D. Control temperature**
- 8. What is the primary purpose of engineering graphics?**
- A. To create detailed circuit diagrams**
 - B. To summarize project management details**
 - C. To visually communicate engineering concepts and designs**
 - D. To record manufacturing processes**
- 9. How is "compressive strength" defined?**
- A. The ability of a material to withstand shear forces**
 - B. The capacity of a material to withstand axial loads that reduce size, typically measured by the maximum pressure it can sustain before failure**
 - C. The measurement of a material's density**
 - D. The evaluation of a material's thermal conductivity**
- 10. What contamination range can the free water detector reliably detect?**
- A. 0-10 ppm**
 - B. 0-20 ppm**
 - C. 0-30 ppm**
 - D. 0-50 ppm**

Answers

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1. B
2. C
3. B
4. A
5. D
6. B
7. A
8. C
9. B
10. B

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Explanations

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1. What test indicates whether any unintended valves are open, allowing fuel to accumulate improperly?

A. Pressure Test

B. Integrity Test

C. Flow Test

D. Leak Detection Test

The integrity test is designed to assess the condition and functionality of systems, ensuring that all components are operating as intended without any unintended openings. In the context of checking for unintended valves that may be open, the integrity test evaluates whether systems maintain their intended sealing and structural quality. This means it identifies any potential breaches or faults that might allow fuel to accumulate inappropriately, which could pose safety hazards or efficiency issues. The other types of tests have specific purposes. For instance, a pressure test measures the system's ability to hold pressure but does not directly assess valve functionality. A flow test measures the movement of fluids within the system but does not provide insights into unintended openings. A leak detection test focuses primarily on identifying existing leaks in a system without specifically addressing valve status. Therefore, the integrity test stands out as the most relevant method for determining if unintended valves may be open, allowing for improper fuel accumulation.

2. What is the number of fuel nozzles on the LM2500?

A. 20

B. 25

C. 30

D. 35

The LM2500 gas turbine engine is designed with a specific configuration that includes a notable number of fuel nozzles, which are crucial for the engine's performance. The correct number of fuel nozzles on the LM2500 is 30, as this design allows for efficient fuel atomization and combustion. In gas turbine engines, having the right number of fuel nozzles is essential for achieving optimal performance and smooth operation. The 30 nozzles facilitate consistent fuel delivery across the combustion chamber, ensuring that the mixture of air and fuel is homogeneous, which in turn leads to effective combustion and efficient energy production. This design aspect directly impacts the engine's reliability and efficiency. Understanding the specific features of the LM2500, including its fuel nozzle configuration, helps in the analysis of its performance characteristics and operational efficiency, which are key factors in engineering applications involving gas turbines.

3. What system removes accumulated water and sediment from the bottoms of fuel tanks?

- A. Fuel Filtration System**
- B. Fuel Stripping System**
- C. Water Separation System**
- D. Fuel Purification System**

The system designed to remove accumulated water and sediment from the bottoms of fuel tanks is known as the Fuel Stripping System. This system typically operates by using pumps or suction tools to effectively remove unwanted liquids and debris that settle at the tank's bottom over time. It's important to regularly clear out this accumulated water and sediment to maintain fuel quality and ensure the proper operation of fuel systems. If water enters the fuel system, it can lead to corrosion, fuel quality degradation, and operational issues within engines and other machinery using that fuel. While the other systems listed may have related functions, none are specifically addressed to the removal of the settled water and sediment in the context of fuel tanks. For instance, the fuel filtration system primarily focuses on filtering out contaminants from the fuel itself as it moves through the system, not necessarily addressing the settled materials at the bottom of the tank. The water separation system is designed to deal with water content in the fuel but does not specifically pull sediment. The fuel purification system generally refers to methods that enhance fuel quality, which may not directly involve the extraction of residues from tank bottoms.

4. What anchors the blades and transmits their force to the shaft?

- A. Rotor**
- B. Steam drum**
- C. Diffusers**
- D. Economizer**

The correct choice refers to the rotor, which serves a crucial role in the operation of turbines or rotors where blades are utilized. The rotor is designed to anchor the blades securely, ensuring that they remain fixed in place while withstanding the forces generated during operation. When the blades are subjected to fluid flow, whether from steam, water, or air, they experience various forces that need to be effectively transferred to the rotor. This transfer of force to the rotor is vital, as it allows the kinetic energy from the fluid to be converted into mechanical energy, which is then transmitted to the shaft for work. In contrast, the other options serve different functions within a system. The steam drum is primarily responsible for separating steam from water in steam-generating systems, the diffusers function to change the pressure and velocity of the working fluid to enhance efficiency, and the economizer is used to preheat the feedwater entering the steam generator to improve the system's overall thermal efficiency. These components are essential for their respective roles but do not directly anchor the blades or transmit force to the shaft like the rotor does.

5. In a four-stroke Diesel engine, during which stroke is fuel injected into the cylinder?

A. Intake

B. Combustion

C. Power

D. Compression

In a four-stroke Diesel engine, fuel injection occurs during the compression stroke. This phase follows the intake stroke, where air is drawn into the cylinder. Once the piston moves up during the compression stroke, the air is compressed to a high pressure and temperature. At the end of this stroke, just before the piston reaches the top dead center, the fuel is injected into the highly compressed air. This injection strategy is crucial as it allows the fuel to ignite spontaneously due to the high temperature of the compressed air, leading to combustion. By injecting during the compression stroke, the design capitalizes on the ideal conditions for efficient fuel combustion, optimizing engine performance and efficiency. The timing of this injection is key to the engine's operation, contributing to smoother power delivery and reduced emissions.

6. Which aspect does the oil water separator focus on during operation?

A. Oil filtration

B. Separation of liquid types

C. Temperature control

D. Pressure regulation

The primary focus of an oil-water separator during operation is the separation of liquid types, specifically the separation of oil from water. This process is essential in various industries to treat wastewater contaminated with oil, ensuring that the water discharged meets environmental standards. The mechanism of an oil-water separator typically relies on the differences in the density and buoyancy of the two liquids. Since oil is generally less dense than water, it tends to float on the surface, allowing for effective separation. This principle is crucial for minimizing environmental impact and allowing for the recovery of oil for potential reuse, as well as for the safe disposal of the cleaned water. The other aspects mentioned, such as oil filtration, temperature control, and pressure regulation, while potentially relevant in different contexts or specific designs, are not the primary operations of an oil-water separator. The focus is distinctly on achieving efficient separation of oil and water, making it the correct answer in this context.

7. What is the main purpose of a steam drum in a boiler system?

- A. Store and separate steam from water**
- B. Preheat feedwater**
- C. Reduce pressure**
- D. Control temperature**

The main purpose of a steam drum in a boiler system is to store and separate steam from water. In a boiler, water is heated to produce steam, and the steam drum serves as a crucial component where this separation occurs. The drum collects steam generated from the boiler water, allowing it to rise to the top while the water remains at the bottom. This separation is essential because it ensures that only fully saturated steam is delivered to the steam header, thus optimizing the efficiency and safety of the steam system. The steam drum also helps maintain water levels and provides a buffer for changes in steam demand, ensuring consistent steam production. Additionally, by allowing steam to accumulate, it facilitates the removal of impurities and excess water droplets that could carry over into the steam delivery system.

8. What is the primary purpose of engineering graphics?

- A. To create detailed circuit diagrams**
- B. To summarize project management details**
- C. To visually communicate engineering concepts and designs**
- D. To record manufacturing processes**

The primary purpose of engineering graphics is to visually communicate engineering concepts and designs. This field emphasizes the use of graphical representation to convey complex ideas and designs in a clear and comprehensible manner. Engineering graphics enables engineers and designers to create detailed illustrations, schematics, and models that help in the visualization of projects, ensuring that all stakeholders can understand the proposed solutions before implementation. This visual form of communication is critical in helping teams collaborate effectively, reduce misunderstandings, and facilitate the accurate realization of engineering projects. In contrast, creating detailed circuit diagrams, summarizing project management details, or recording manufacturing processes, while important tasks in their respective areas, do not capture the broader role that engineering graphics plays in communicating and presenting intricate engineering ideas. Engineering graphics serves a foundational role across various engineering disciplines, making it an essential skill for conveying plans, models, and concepts in a universally understandable format.

9. How is "compressive strength" defined?

- A. The ability of a material to withstand shear forces
- B. The capacity of a material to withstand axial loads that reduce size, typically measured by the maximum pressure it can sustain before failure**
- C. The measurement of a material's density
- D. The evaluation of a material's thermal conductivity

Compressive strength is defined as the capacity of a material to withstand axial loads that reduce its size. This property is crucial in determining how materials perform under heavy loads, particularly in applications like construction and manufacturing where materials must support significant weight without failing. When a material is subjected to compressive forces, it experiences shortening and a corresponding increase in internal stress until it reaches its limit. The measurement is typically represented by the maximum pressure the material can sustain before it fails, which is critical for engineers when selecting materials for structural applications to ensure safety and stability. Understanding compressive strength allows for effective material selection and design, ensuring that structures can endure expected loads without experiencing catastrophic failure. The other options refer to different material properties that do not relate to how materials respond to compressive forces, underscoring why the definition pertaining to compressive strength is specifically aligned with axial loading and resistance to size reduction.

10. What contamination range can the free water detector reliably detect?

- A. 0-10 ppm
- B. 0-20 ppm**
- C. 0-30 ppm
- D. 0-50 ppm

The free water detector is designed to identify small amounts of water contamination in liquids, particularly in petroleum products. The reliability of detection is crucial for maintaining quality and preventing issues such as product degradation or failure in equipment due to water presence. The choice of the 0-20 ppm range is aligned with industry standards for many free water detectors, which are typically calibrated to provide accurate readings within this limit. This range allows for the early detection of water, which is critical in applications where moisture can lead to significant problems, including corrosion, microbial growth, and reduced efficiency of the product. Others options suggest broader ranges, but they may not reflect the precision necessary for effective monitoring in many applications. A detector rated for 0-20 ppm is generally considered adequate for ensuring that water levels remain low enough to avoid negative impacts on equipment performance and product integrity.