Machinist's Mate (MM) Advancement Practice Test (Sample)

Study Guide

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Questions

1. When tightening male threads on fasteners, how many threads should protrude beyond the top of the nut?

A. No threads

B. At least half a thread

C. At least one thread length

D. At least two thread lengths

2. What device allows for equalized cooling of the shaft after securing the engine?

A. Main engine jacking gear

B. Cooling pump

C. Lubrication system

D. Thrust bearing

3. Which measurement tool is most sensitive for precision measurements in machining?

A. Caliper

B. Vernier scale

C. Micrometer

D. Ruler

4. An operating main condenser must be secured if vacuum levels reach how many inches?

A. 10"

B. 12"

C. 15"

D. 18"

5. What can modern naval boilers tolerate before suffering tube ruptures due to scale?

A. Inches of scale

B. A few hundredths of an inch of scale

C. A few thousandths of an inch of scale

D. Decimeters of scale

6. When must a constant be re-established on a main engine bearing?

A. After maintenance is performed

B. Upon bearing replacement

C. After an oil analysis

D. On a regular maintenance schedule

7. Once a boiler purge is complete, within what time frame must fires be lighted?

A. 3 minutes

B. 5 minutes

C. 7 minutes

D. 10 minutes

8. The lube oil cooler should be bypassed on an operating auxiliary turbine until the discharge oil temperature reaches what?

A. 80 degrees F

B. 90 degrees F

C. 100 degrees F

D. 110 degrees F

9. What are the three basic physical states of all matter?

A. Solid, liquid and plasma

B. Solid, liquid and gas

C. Liquid, gas and vapor

D. Solid, vapor and gas

10. What factors determine the amount of oxygen that will dissolve in water?

A. Temperature and salinity

B. Surface tension and pressure

C. Surface pressure and temperature

D. Humidity and temperature

Answers

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

Explanations

1. When tightening male threads on fasteners, how many threads should protrude beyond the top of the nut?

A. No threads

B. At least half a thread

C. At least one thread length

D. At least two thread lengths

When tightening male threads on fasteners, the goal is to ensure proper engagement and to avoid potential failure or stripping of the threads. Allowing at least one thread length to protrude beyond the top of the nut provides several benefits. It helps ensure that the load on the fastener is distributed properly and that the joint is secure and stable. This protrusion also enables a visual indicator that the fastener is adequately engaged; if the threads are completely recessed within the nut, it could suggest insufficient tightening or engagement. In contrast, not allowing any threads to protrude can lead to a weak connection. If there are only half a thread or less protruding, the fastener may not be securely fastened, risking it loosening under load or vibration. This engagement principle is essential in mechanical systems, where maintaining strength and integrity in fastened connections is crucial for operational safety and effectiveness.

2. What device allows for equalized cooling of the shaft after securing the engine?

A. Main engine jacking gear

B. Cooling pump

C. Lubrication system

D. Thrust bearing

The main engine jacking gear is the device that allows for equalized cooling of the shaft after the engine is secured. This system is used to rotate the shaft slowly and evenly when the engine is not in operation, ensuring that cooling water can circulate evenly around the components. This helps prevent thermal stress and keeps the temperature of the shaft and surrounding components uniform. By using the jacking gear, you can avoid potential warping or damage that can occur if one part of the engine cools at a different rate than another. In contrast, the cooling pump is primarily responsible for circulating coolant through the engine to maintain operational temperatures rather than managing cooling after the engine has been shut down. The lubrication system is designed for the distribution of oil to reduce friction during engine operation and does not have a direct function in addressing thermal concerns once the engine is secured. The thrust bearing is crucial for handling axial loads but does not play a role in cooling the shaft once the engine is turned off.

3. Which measurement tool is most sensitive for precision measurements in machining?

A. Caliper

B. Vernier scale

C. Micrometer

D. Ruler

The micrometer is the most sensitive tool for precision measurements in machining because it is specifically designed to measure small dimensions with a high degree of accuracy. Micrometers can achieve precision measurements down to one-thousandth of an inch (0.001") or even finer, depending on the specific type of micrometer being used, such as a digital or fractional micrometer. The design of a micrometer includes a screw mechanism that allows the user to make very fine adjustments to the measurement, providing a clear reading on a calibrated scale. This level of precision is essential in machining, where even a small deviation can affect the function of the part being produced. In contrast, while calipers and vernier scales are valuable tools for measuring, they generally do not offer the same level of accuracy as a micrometer. A ruler, although useful for rough measurements, lacks the necessary precision for detailed machining tasks. Thus, the micrometer stands out as the superior choice for precision in measurements within the machining field.

4. An operating main condenser must be secured if vacuum levels reach how many inches?

A. 10"

B. 12"

C. 15"

D. 18"

The main condenser in a marine propulsion system is designed to operate within specific vacuum levels to maintain its efficiency and performance. If the vacuum level reaches 15 inches, it indicates that the condenser is not effectively removing heat from the steam, which can lead to a range of operational issues, including decreased efficiency and potential damage to the components. At 15 inches of vacuum, it is crucial to secure the condenser to prevent further decline in performance and to allow for troubleshooting or maintenance. By doing so, the crew can investigate the cause of the excessive vacuum and address any underlying problems, such as blockages or pump failures. Maintaining proper vacuum levels is essential for the optimal function of the condenser, as it directly impacts the steam cycle and the overall efficiency of the propulsion system. Securing the condenser at this specific vacuum threshold ensures the safety and functionality of the system, allowing for corrective actions to be taken before further complications arise.

5. What can modern naval boilers tolerate before suffering tube ruptures due to scale?

A. Inches of scale

B. A few hundredths of an inch of scale

C. A few thousandths of an inch of scale

D. Decimeters of scale

Modern naval boilers are highly engineered systems designed to withstand specific conditions and maintain efficiency. The correct answer indicates that a few thousandths of an inch of scale buildup is the threshold before serious issues, such as tube ruptures, may occur. When scale, which is primarily composed of mineral deposits, accumulates within the boiler tubes, it can act as an insulator, preventing efficient heat transfer. This insulation effect can lead to localized overheating of the metal tubes, increasing the risk of failure due to thermal stress. The tolerance of a few thousandths of an inch reflects the precision required in boiler operations to maintain safety and efficiency. Beyond this threshold, the integrity of the boiler tubes can be compromised, leading to costly repairs and operational risks. In practice, maintaining scale within this tight tolerance is essential for the safe operation of modern naval vessels, as excessive buildup would not only risk tube failure but also negatively impact overall boiler performance.

6. When must a constant be re-established on a main engine bearing?

A. After maintenance is performed

B. Upon bearing replacement

C. After an oil analysis

D. On a regular maintenance schedule

Re-establishing a constant on a main engine bearing is crucial for ensuring optimal functionality and performance of the engine. It is necessary to do this specifically upon bearing replacement. When a bearing is replaced, there are changes in its dimensions and surface characteristics, which can significantly alter the operating conditions such as clearance and lubrication effectiveness. Establishing the correct constant after replacement ensures that the bearing will operate within the specified parameters, minimizing wear and optimizing the engine's efficiency. The other scenarios, while important for maintenance, do not inherently require the immediate re-establishment of a constant in the same direct way as a bearing replacement does. After maintenance is performed, it may involve various checks and balances, but those do not relate as directly to the bearing's operational constants. After an oil analysis, while crucial for assessing lubricant condition, does not affect the dimensional integrity of the bearing itself. A regular maintenance schedule is vital for overall engine health and performance, but it is not tied specifically to the bearing constants unless a replacement is involved. Therefore, the specific requirement to re-establish constants follows directly from the fundamental need to ensure proper fitting and performance after changing the bearing itself.

7. Once a boiler purge is complete, within what time frame must fires be lighted?

A. 3 minutes

B. 5 minutes

C. 7 minutes

D. 10 minutes

The correct choice specifies that fires must be lighted within 5 minutes after a boiler purge is complete. This time frame is critical because it helps ensure safe operation and prevents any potential hazards that may arise from residual gases or unburned fuel that can linger in the system after purging. The boiler purge process is designed to clear out flammable vapors and other combustion byproducts, and waiting too long before igniting the burner could lead to dangerous situations such as gas accumulation. By initiating the lighting of the fires within this 5-minute window, operators can maintain a secure environment and ensure that the boiler is prepared for safe and effective operation. While other time frames like 3, 7, or 10 minutes might seem plausible, they do not align with the established safety protocols and guidelines that govern boiler operations. Understanding this timing is essential for maintaining not only operational efficiency but also safety standards in boiler management.

8. The lube oil cooler should be bypassed on an operating auxiliary turbine until the discharge oil temperature reaches what?

A. 80 degrees F

B. 90 degrees F

C. 100 degrees F

D. 110 degrees F

The recommended bypass temperature for the lube oil cooler on an operating auxiliary turbine is 100 degrees Fahrenheit. This temperature is important because it ensures the lube oil reaches an optimal operating temperature that can effectively lubricate the turbine's components. Bypassing the cooler at this temperature allows the oil to circulate without having to be cooled further, which can be beneficial during the initial warm-up phase of the turbine operation. As the temperature approaches 100 degrees F, the oil becomes less viscous, allowing it to flow more freely and provide better lubrication qualities. Operating below this temperature may result in poor lubrication, leading to increased wear and potential damage to the turbine components. Thus, monitoring the discharge oil temperature is critical to ensure that the lube oil is maintained at optimal conditions for safe and efficient turbine operation.

9. What are the three basic physical states of all matter?

A. Solid, liquid and plasma

B. Solid, liquid and gas

C. Liquid, gas and vapor

D. Solid, vapor and gas

The three basic physical states of all matter are solid, liquid, and gas. This classification is based on the arrangement and behavior of the molecules within each state. In a solid, molecules are tightly packed together, maintaining a fixed shape and volume. In a liquid, while the molecules are still close together, they are free to move past one another, allowing liquids to take the shape of their container while retaining a definite volume. In a gas, molecules are much farther apart and move freely, resulting in neither a fixed shape nor a fixed volume. This fundamental understanding of how matter can exist in these three states is critical in various applications, particularly in fields like engineering and physics. The other choices do not accurately represent the three primary states. For instance, while plasma is a state of matter, it's not one of the three basic states typically introduced in elementary science. Similarly, vapor refers to a gas that is in equilibrium with its liquid state, making it a specific condition rather than a primary state of matter.

10. What factors determine the amount of oxygen that will dissolve in water?

A. Temperature and salinity

B. Surface tension and pressure

C. Surface pressure and temperature

D. Humidity and temperature

The amount of oxygen that will dissolve in water is primarily influenced by temperature and pressure. As water temperature increases, the solubility of gases, including oxygen, generally decreases because warmer water holds less gas compared to cooler water. Additionally, pressure plays a significant role in gas solubility; higher pressure increases the amount of gas that can dissolve in a liquid, while lower pressure reduces it. While surface tension can affect the gas exchange at the water's surface, it is not a primary factor in determining the overall solubility of dissolved oxygen in water. Similarly, salinity impacts the solubility of gases, but it's not included in your selected answer. Humidity relates more to air conditions rather than the solubility of gases in water. Therefore, focusing on the interplay between temperature and pressure provides the most accurate understanding of oxygen solubility in aquatic environments.