

New Jersey Third Grade Refrigeration Engineer (2-C Blue Seal) License Practice Exam (Sample)

Study Guide



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SAMPLE

Questions

SAMPLE

- 1. What is the minimum fine for any infraction in NJ?**
 - A. \$50**
 - B. \$1000**
 - C. \$100**
 - D. \$500**
- 2. Which is a false statement about a shell and tube condenser?**
 - A. Water is normally circulated through the shell**
 - B. Discharge water may be used at a compressor coolant**
 - C. If the water supply is scarce, a cooling tower may be used**
 - D. May be both a condenser and receiver**
- 3. What is thermal expansion in refrigeration?**
 - A. The increase in pressure of the refrigerant**
 - B. The increase in volume of refrigerants as they absorb heat**
 - C. The decrease in volume as refrigerants cool**
 - D. The process of refrigerants changing state**
- 4. What is the role of the compressor in a refrigeration system?**
 - A. It cools the refrigerant gas**
 - B. It absorbs heat from the environment**
 - C. It compresses the refrigerant gas**
 - D. It condenses refrigerant into a liquid**
- 5. What is the role of an oil separator in a refrigeration system?**
 - A. To mix refrigerants for better performance**
 - B. To remove oil from refrigerant vapor**
 - C. To store excess refrigerant**
 - D. To increase system pressure**

- 6. What is the effect of overcharging a refrigeration system?**
- A. It improves cooling efficiency**
 - B. It can cause high pressure and potential system failure**
 - C. It increases airflow**
 - D. It has no impact on system operation**
- 7. Which of the following does not increase compressor surging?**
- A. Decreasing the compression rational speed**
 - B. Decreasing the evaporator temperature**
 - C. Increasing the discharge pressure**
 - D. Increasing the suction pressure**
- 8. What is the purpose of a thermostatic expansion valve in a refrigeration system?**
- A. To increase the pressure of the refrigerant**
 - B. To regulate the flow of refrigerant into the evaporator**
 - C. To condense refrigerant gas**
 - D. To store excess refrigerant**
- 9. What effect would a float filled with liquid have on a system using a high side float?**
- A. A. The compressor safety would lift**
 - B. B. The condenser would flood with refrigerant**
 - C. C. The evaporator would flood with refrigerant**
 - D. D. The evaporator would starve for refrigerant**
- 10. Describe one way to increase the efficiency of a refrigeration system.**
- A. By using more refrigerant than necessary**
 - B. By regularly cleaning coils and checking refrigerant levels**
 - C. By reducing the size of the condenser**
 - D. By increasing the thermostat settings**

Answers

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

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Explanations

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1. What is the minimum fine for any infraction in NJ?

- A. \$50**
- B. \$1000**
- C. \$100**
- D. \$500**

The minimum fine for any infraction in New Jersey is set at \$500. This figure is established in the context of various regulatory and legal frameworks within the state. The intention behind this minimum fine is to underscore the seriousness of infractions, ensuring that there is a significant consequence for non-compliance with state laws and regulations. Setting a minimum fine of \$500 helps to deter infractions by establishing a clear financial repercussion, thereby promoting adherence to laws designed to protect public safety and welfare. Fines below this threshold would not align with New Jersey's regulatory philosophy on maintaining order and compliance among professionals and businesses.

2. Which is a false statement about a shell and tube condenser?

- A. Water is normally circulated through the shell**
- B. Discharge water may be used at a compressor coolant**
- C. If the water supply is scarce, a cooling tower may be used**
- D. May be both a condenser and receiver**

In reviewing the characteristics of a shell and tube condenser, it's important to note that a shell and tube condenser typically has a specific design where the refrigerant absorbs heat and condenses on the tube side, while the cooling water circulates through the shell side. Thus, stating that water is "normally circulated through the shell" does not accurately represent the common operating principle; rather, the refrigerant flows within the tubes, while the cooling water flows around the outside of these tubes in the shell. The other statements about shell and tube condensers reflect accurate practices in refrigeration systems. For example, using discharge water from a compressor as coolant can be part of a different setup in systems where waste heat is utilized, and the mention of cooling towers in cases of scarce water supply supports the need for alternative cooling methods. Additionally, it is entirely feasible for a shell and tube unit to function both as a condenser and as a receiver, depending on the design and application. Thus, the false statement is one that misrepresents the fundamental operation of a shell and tube condenser regarding the flow of cooling water.

3. What is thermal expansion in refrigeration?

- A. The increase in pressure of the refrigerant
- B. The increase in volume of refrigerants as they absorb heat**
- C. The decrease in volume as refrigerants cool
- D. The process of refrigerants changing state

Thermal expansion in refrigeration refers to the increase in volume of refrigerants as they absorb heat. When a refrigerant absorbs heat, its temperature rises, causing the molecules to move faster and spread apart. This increased kinetic energy results in an expansion of the refrigerant, thereby increasing its volume. Understanding thermal expansion is crucial in refrigeration systems because it affects how refrigerants behave during the various phases of the refrigeration cycle. For instance, in the evaporator, the refrigerant must efficiently absorb heat from the environment, which leads to its expansion and phase change from a liquid to a gas. This principle is essential for the efficient operation of refrigeration systems, ensuring that they can effectively transfer heat and maintain desired temperature levels. The other concepts listed, such as pressure changes and changes in state, are also important in the context of refrigeration but do not specifically define thermal expansion, which is primarily concerned with the increase in volume as heat is absorbed.

4. What is the role of the compressor in a refrigeration system?

- A. It cools the refrigerant gas
- B. It absorbs heat from the environment
- C. It compresses the refrigerant gas**
- D. It condenses refrigerant into a liquid

The compressor's primary function in a refrigeration system is to compress the refrigerant gas. When the refrigerant gas enters the compressor, it is at low pressure and low temperature. The compressor works to increase its pressure, which raises its temperature as well. This process is crucial because it prepares the refrigerant for heat exchange in the condenser, where it will release the heat absorbed from the space being cooled. The process of compression is essential for maintaining the refrigeration cycle, as it enables the refrigerant to circulate through the system efficiently. After the refrigerant is compressed, it moves to the condenser, where it releases heat to the environment and condenses into a liquid, ready to return to the evaporator. Understanding the role of the compressor helps in grasping how refrigeration systems operate overall, highlighting that the compression of the refrigerant gas is a key step in the refrigeration process.

5. What is the role of an oil separator in a refrigeration system?

- A. To mix refrigerants for better performance**
- B. To remove oil from refrigerant vapor**
- C. To store excess refrigerant**
- D. To increase system pressure**

The role of an oil separator in a refrigeration system is primarily to remove oil from refrigerant vapor. This component plays a crucial part in ensuring the efficient operation of the system. Refrigeration systems use oil to lubricate the compressor, and as the refrigerant circulates, some oil can get carried along with the refrigerant vapor. If too much oil remains in the refrigerant vapor, it can affect the system's heat transfer capabilities and lead to performance issues, such as decreased efficiency and higher energy consumption. The oil separator captures the oil from the vapor and returns it back to the compressor or the oil sump, allowing the refrigerant to flow through the system more effectively. This separation helps maintain optimal operating conditions within the refrigeration cycle and prolongs the life of the compressor and other components. The other choices do not accurately reflect the function of an oil separator in a refrigeration system. Mixing refrigerants does not pertain to the function of oil separation; storing excess refrigerant and increasing system pressure do not describe the operational purpose of an oil separator either. Thus, the correct understanding of the oil separator's role is essential for maintaining system efficiency and reliability.

6. What is the effect of overcharging a refrigeration system?

- A. It improves cooling efficiency**
- B. It can cause high pressure and potential system failure**
- C. It increases airflow**
- D. It has no impact on system operation**

Overcharging a refrigeration system refers to the situation where there is too much refrigerant in the system. This excess refrigerant can lead to increased pressure within the system. A refrigeration system operates within a specific pressure range, and exceeding this range can stress components and lead to a variety of problems, including potential system failure. When there is too much refrigerant, it can cause the compressor to work harder than necessary, leading to overheating or failure. Additionally, excessive pressure can affect other components, such as the evaporator and condenser, compromising their efficiency and potentially causing leaks or ruptures. Therefore, it is crucial to maintain the appropriate refrigerant level to ensure optimal performance and reliability of the refrigeration system.

7. Which of the following does not increase compressor surging?

- A. Decreasing the compression rational speed**
- B. Decreasing the evaporator temperature**
- C. Increasing the discharge pressure**
- D. Increasing the suction pressure**

To understand why decreasing the evaporator temperature does not increase compressor surging, it's important to recognize what compressor surging entails. Compressor surging is an unstable operating condition that occurs when the compressor experiences a reduction in airflow, leading to fluctuations in pressure and can cause damage to the system. When the evaporator temperature is decreased, the refrigerant can absorb more heat. This typically results in an increase in the pressure in the evaporator, which means that the vapor entering the compressor is typically at a higher density and can improve the efficiency of the system. By allowing the compressor to operate more smoothly and efficiently, this change in temperature can help prevent the conditions that lead to surging. In contrast, the other options mentioned—lowering the compression rational speed, increasing the discharge pressure, and increasing the suction pressure—can lead to situations where the flow of refrigerant may become unstable, increasing the potential for surging. Each of these conditions might create a scenario where the compressor is unable to handle the demand, leading to airflow disruptions that could result in surging. Thus, the action of decreasing the evaporator temperature actually enhances the compressor's operation, reducing the likelihood of surging, which makes it the correct choice in this context.

8. What is the purpose of a thermostatic expansion valve in a refrigeration system?

- A. To increase the pressure of the refrigerant**
- B. To regulate the flow of refrigerant into the evaporator**
- C. To condense refrigerant gas**
- D. To store excess refrigerant**

The thermostatic expansion valve plays a crucial role in a refrigeration system by regulating the flow of refrigerant into the evaporator. This regulation is essential because it ensures that the right amount of refrigerant is supplied based on the cooling demand of the system. When the evaporator requires more cooling, the valve opens to allow additional refrigerant to flow in, which facilitates more efficient heat absorption from the surroundings. Conversely, if less cooling is needed, the valve reduces the flow, preventing the evaporator from being flooded with refrigerant. This selective flow control contributes to maintaining optimal system performance and enhances energy efficiency by preventing compressor strain and potential freezing issues in the evaporator. The other options do not align with the primary function of the thermostatic expansion valve, as it is not responsible for increasing refrigerant pressure, condensing it, or storing excess refrigerant.

9. What effect would a float filled with liquid have on a system using a high side float?

- A. A. The compressor safety would lift**
- B. B. The condenser would flood with refrigerant**
- C. C. The evaporator would flood with refrigerant**
- D. D. The evaporator would starve for refrigerant**

In a refrigeration system using a high side float, the primary function of the float is to control the flow of refrigerant entering the evaporator. If the float is filled with liquid, it indicates that there is an excess of refrigerant in the system, effectively causing the high side float to close or restrict the flow of refrigerant to the evaporator. This situation leads to a condition where insufficient refrigerant reaches the evaporator, resulting in it starving for refrigerant. The concept of "starving" refers to the state where the evaporator does not receive an adequate amount of refrigerant necessary for proper cooling. This can lead to reduced efficiency, potential ice formation on the evaporator coils, and ultimately poor system performance. The float mechanism is designed to prevent flooding in the evaporator by managing the refrigerant flow based on its liquid level; therefore, a high liquid level in the float indicates a need to limit or stop the flow to maintain balance in the system.

10. Describe one way to increase the efficiency of a refrigeration system.

- A. By using more refrigerant than necessary**
- B. By regularly cleaning coils and checking refrigerant levels**
- C. By reducing the size of the condenser**
- D. By increasing the thermostat settings**

Increasing the efficiency of a refrigeration system can be effectively achieved by regularly cleaning coils and checking refrigerant levels. Over time, dirt and debris can accumulate on the coils, which impairs heat exchange. When coils are dirty, the system has to work harder to remove heat from the refrigerant, consuming more energy and reducing overall efficiency. By keeping the coils clean, the system can operate more optimally, allowing for better heat transfer and less energy consumption. Regularly checking refrigerant levels is also crucial because the efficiency of the refrigeration cycle is directly related to the correct amount of refrigerant present. An undercharged system can lead to reduced cooling capacity and increased energy usage, while an overcharged system can also cause inefficiencies and potential damage. Therefore, maintaining clean coils and proper refrigerant levels ensures that the refrigeration system runs smoothly, efficiently, and reliably.