

Questions for the AEE CEM Exam 2026 - Ensure Your Success

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QUESTIONS WITH CORRECT DETAILED
ANSWERS || 100% GUARANTEED PASS
<RECENT VERSION>**

1. Emergency - ANSWER ✓ Event that can usually be handled by existing resources, particularly by first responders (fire, police, ambulance) but does not require activation of an EOC or disrupt the community.
2. Disaster - ANSWER ✓ Event that disrupts community functioning and requires resources beyond those used for routine emergencies (e.g., ambulances)
3. Catastrophe - ANSWER ✓ Event that disrupts regional capacities to respond to those affected and requires resources outside the area for an extended time.
4. Emergent Norm Theory - ANSWER ✓ Sociological perspective describing how people respond and adapt to the dynamic conditions fostered by a disaster environment; evolution of new individual, group, and organizational behavioral guidelines.
5. Systems Theory - ANSWER ✓ Perspective focused on the interaction of the built, physical, and human environments.
6. Hazard Identification - ANSWER ✓ Identifying the history, frequency, and location of specific hazards and how they may impact a given location.
7. Risk Analysis - ANSWER ✓ Calculating the potential for an impact and the associated losses based on findings of a hazard identification

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AEE Certified Energy Manager (CEM) Sample Questions (Q120-Q125):

NEW QUESTION # 120

Which of the advantages listed below, makes an ice TES system more preferred over a water TES system, when a load shifting strategy is considered?

- A. Ice-storage systems operate with a higher coefficient of performance (COP)
- B. Water-storage systems require smaller storage tanks since water has a higher density than ice
- C. **Ice-storage systems require smaller storage tanks since ice has a higher energy storage density**
- D. Ice-storage systems require lower maintenance due to lower pumping volume

Answer: C

Explanation:

To determine which advantage makes an ice Thermal Energy Storage (TES) system more preferred over a water TES system for a load shifting strategy, we need to evaluate each option based on the principles of thermal energy storage as outlined in the Association of Energy Engineers (AEE) Certified EnergyManager (CEM) training materials. Load shifting involves storing energy (cooling capacity) during off-peak periods and releasing it during peak demand, making storage efficiency and capacity critical. Let's analyze each option step-by-step.

Step 1: Understand Ice TES vs. Water TES in Load Shifting

- * Ice TES: Uses the latent heat of fusion of water (ice melting) to store cooling energy. Ice is formed during off-peak hours (e.g., overnight) and melted during peak hours to provide cooling.
- * Water TES: Uses the sensible heat capacity of water, storing chilled water (typically 4-6°C) to provide cooling.
- * Load Shifting Goal: Maximize cooling storage in minimal space and cost, shifting electrical demand from peak to off-peak periods.
- * CEM Reference: CEM materials in the "Thermal Energy Storage" section highlight ice TES for its high energy density and compact storage, contrasted with water TES for simpler operation but larger volume requirements.

Step 2: Evaluate Each Option

Option A: Ice-storage systems operate with a higher coefficient of performance (COP)

* Analysis:

- * COP Definition: COP = (Cooling Output) / (Energy Input). For TES, this relates to the chiller's efficiency.
- * Ice TES: Requires chillers to operate at lower temperatures (e.g., -5°C to 0°C) to freeze water, which typically reduces chiller COP (e.g., 3-4) compared to water TES chillers operating at 4-6°C (COP ~5-6).
- * Reality: Ice TES systems often have a lower COP due to the additional energy needed for phase change, though total system efficiency may improve with load shifting benefits.
- * CEM Reference: CEM notes that ice TES energy input is higher per unit of cooling due to lower evaporating temperatures, contradicting a "higher COP" claim.
- * Conclusion: This statement is incorrect and not an advantage for ice TES in load shifting.

Option B: Ice-storage systems require smaller storage tanks since ice has a higher energy storage density

* Analysis:

* Energy Storage Density:

- * Ice TES: Relies on latent heat of fusion = 334 kJ/kg (80 kcal/kg or ~144 Btu/lb). This is the energy absorbed/released when water freezes/melts, far exceeding sensible heat.

* Water TES: Relies on sensible heat = $cp \cdot \Delta T$, where $cp = 4.18 \text{ kJ/kg} \cdot \text{°C}$. For a typical $\Delta T = 10^\circ\text{C}$ (e.g., 4°C to 14°C), energy stored = $4.18 \times 10 = 41.8 \text{ kJ/kg}$.

* Comparison: Ice stores ~8 times more energy per kg than water for a 10°C range (334 vs. 41.8 kJ/kg).

* Volume Impact: Ice's density (~917 kg/m³) is slightly less than water (~1000 kg/m³), but the latent heat advantage dominates, reducing required tank volume significantly.

* Load Shifting: Smaller tanks mean less space and potentially lower capital costs, a key advantage for peak load management.

* CEM Reference: CEM training emphasizes ice TES's high energy density as a primary reason for its preference in space-constrained load shifting applications.

* Conclusion: This statement is correct and a clear advantage for ice TES.

Option C: Water-storage systems require smaller storage tanks since water has a higher density than ice

* Analysis:

* Density: Water = 1000 kg/m³; Ice = 917 kg/m³. Water is denser, but density alone doesn't determine storage size in TES.

* Energy Storage: As calculated, water's sensible heat capacity (e.g., 41.8 kJ/kg for 10°C) is much lower than ice's latent heat (334 kJ/kg). To store the same cooling capacity, water TES requires

~8 times more mass and thus larger tanks (even accounting for density differences).

* Implication: Water TES tanks are larger, not smaller, contradicting the statement.

* CEM Reference: CEM materials note water TES's larger volume requirements as a disadvantage compared to ice TES.

* Conclusion: This statement is incorrect and not an advantage for ice TES (it favors water TES incorrectly).

Option D: Ice-storage systems require lower maintenance due to lower pumping volume

* Analysis:

* Pumping Volume: Ice TES often uses glycol or brine solutions to transfer heat at lower temperatures, requiring pumps sized for smaller volumes due to concentrated cooling capacity.

Water TES circulates larger volumes of chilled water. However, "lower pumping volume" doesn't directly translate to "lower maintenance."

* Maintenance: Ice TES systems are more complex (ice-making equipment, heat exchangers), potentially increasing maintenance (e.g., defrost cycles, corrosion from brine). Water TES is simpler, often with lower maintenance needs.

* CEM Reference: CEM discusses ice TES complexity as a trade-off for its density advantage, not a maintenance benefit.

* Conclusion: This statement is questionable and not a primary advantage for load shifting.

Step 3: Identify the Key Advantage for Load Shifting

* Load Shifting Context: The goal is to store maximum cooling capacity efficiently during off-peak hours. Option B (smaller tanks due to higher energy storage density) directly supports this by reducing space and installation costs, a critical factor in TES design per CEM guidelines.

* Elimination:

* A: Incorrect (lower COP, not higher).

* C: Incorrect (water TES tanks are larger).

* D: Weak (maintenance isn't clearly lower; not the primary driver).

* B: Correct and relevant.

NEW QUESTION # 121

A 50-kW induction motor (1,500 rpm synchronous speed) has a nameplate full-load rotational speed of 1,455 rpm. Field measurements show the actual rotational speed is 1,475 rpm. Using the slip method, calculate the partial load factor of the motor.

- A. 46%
- B. 98%
- C. 101%
- D. 56%
- E. 80%

Answer: E

NEW QUESTION # 122

Using a degree-day base of 18°C, calculate the number of cooling degree days (CDD) if the outside temperature is a uniform 25°C throughout the year (365 days/year).

- A. 2,250 CDD/yr
- B. 2,975 CDD/yr
- C. 2,555 CDD/yr
- D. 1,845 CDD/yr
- E. 1,955 CDD/yr

Answer: B

NEW QUESTION # 123

Which electric rate tariff would best cost justify a thermal energy storage (TES) system?

- A. Great differential between high season and low season demand rates
- B. Great differential between off-peak and on-peak time-of-use electricity rates
- C. Low electricity rate and low peak-demand rate
- D. Great differential between high season and low season electricity rates

- E. High electricity rate and low peak-demand rate

Answer: B

NEW QUESTION # 124

Which of the following statements regarding refrigerants is NOT correct?

SELECT THE CORRECT ANSWER

- A. R-22 is a Hydro Chloro Carbon with significant ozone depleting potential and significant global warming impact
- B. R-32 and R-134a are Hydro Fluoro Carbons with zero ozone depleting potential, and significant global warming impact
- C. R-11 and R-12 are Chloro Fluoro Carbons with significant ozone depleting potential
- D. R-1234yf is a Hydro Fluoro Olefin with zero ozone depleting potential, and little global warming potential
- E. R-407C is a blended Hydro Fluoro Carbon or near Azeotropic mixture, and can be used as a replacement for R-22 in commercial applications

Answer: A

Explanation:

Understanding the environmental impacts of various refrigerants is crucial for energy managers. Let's analyze each statement:
A: R-407C is a blended Hydro Fluoro Carbon or near Azeotropic mixture, and can be used as a replacement for R-22 in commercial applications: This statement is correct. R-407C is a blend of HFCs designed to replace R-22 in air conditioning systems.

B: R-11 and R-12 are Chloro Fluoro Carbons with significant ozone depleting potential: This is correct. R-11 and R-12 are CFCs known for their high ozone depletion potential.

C: R-1234yf is a Hydro Fluoro Olefin with zero ozone depleting potential, and little global warming potential: Correct. R-1234yf is an HFO with negligible ozone depletion and low global warming potential.

D: R-22 is a Hydro Chloro Carbon with significant ozone depleting potential and significant global warming impact: This statement is incorrect. R-22 is a Hydrochlorofluorocarbon (HCFC), not a Hydro Chloro Carbon. While it does have ozone-depleting potential, its global warming potential is considered moderate, not significant.

E: R-32 and R-134a are Hydro Fluoro Carbons with zero ozone depleting potential, and significant global warming impact: This is correct. Both R-32 and R-134a are HFCs with no ozone depletion potential but have considerable global warming potential.

Conclusion:

The incorrect statement is D. R-22 is a Hydro Chloro Carbon with significant ozone depleting potential and significant global warming impact. Therefore, the correct answer is D.

NEW QUESTION # 125

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