TS PGECET 2025 Question Paper With Solutions

Time Allowed :2 Hours	**Maximum Marks :**120	**Total questions :**120

General Instructions

Read the following instructions very carefully and strictly follow them:

1. **Mode of Examination:** Online (Computer-based examination)
2. **Medium of Exam:** English
3. **Duration of Exam:** 2 hours
4. **Type of Questions:** Multiple-choice questions
5. **Number of Questions:** 120 Questions
6. **Total Marks:** 120 Marks
7. **Marking Scheme:**
    - 1 mark for each correct answer.
    - No negative markings for incorrect answers.

1. If the roots of the quadratic equation $ax^2 + bx + c = 0$ are real and distinct, what is the condition on the discriminant?

(A) $b^2 - 4ac > 0$

(B) $b^2 - 4ac = 0$

(C) $b^2 - 4ac < 0$

(D) None of the above

Correct Answer: (A) $b^2 - 4ac > 0$

Solution:

The discriminant of a quadratic equation $ax^2 + bx + c = 0$ is given by:

$$\Delta = b^2 - 4ac$$

For the roots to be real and distinct, the discriminant must be positive. Thus, the condition for real and distinct roots is:

$$\Delta = b^2 - 4ac > 0$$

Therefore, the correct answer is:

$$\boxed{(A)\, b^2 - 4ac > 0}$$

Quick Tip

To determine the nature of the roots, always check the discriminant (Δ): if $\Delta > 0$, the roots are real and distinct.

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2. Which of the following is a characteristic of a deadlock in a computer system?

(A) Mutual exclusion

(B) Hold and wait

(C) Circular wait

(D) All of the above

Correct Answer: (D) All of the above

Solution:

A deadlock in a computer system occurs when a set of processes are blocked because each one is waiting for another to release a resource. The four necessary conditions for a deadlock to occur are:

1. Mutual exclusion: At least one resource must be held in a non-shareable mode, i.e., only one process can use the resource at a time.

2. Hold and wait: A process holding at least one resource is waiting for additional resources held by other processes.

3. No preemption: Resources cannot be forcibly taken from a process; they can only be released voluntarily.

4. Circular wait: A set of processes exists such that each process is waiting for a resource that the next process in the set holds.

Since all of these conditions are necessary for a deadlock to occur, the correct answer is:

$$\boxed{(D)\text{ All of the above}}$$

Quick Tip

To identify deadlock conditions, recall the four key aspects: mutual exclusion, hold and wait, no preemption, and circular wait.

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3. In an RLC series circuit, at resonance, the impedance is:

(A) Minimum

(B) Maximum

(C) Equal to the sum of R, L, and C

(D) Zero

Correct Answer: (A) Minimum

Solution:

In an RLC series circuit, the impedance Z is given by:

$$Z = R + j\left(\omega L - \frac{1}{\omega C}\right)$$

where R is the resistance, L is the inductance, C is the capacitance, and ω is the angular frequency. At resonance, the inductive reactance ωL and capacitive reactance $\frac{1}{\omega C}$ are equal in magnitude but opposite in sign, so their effects cancel each other out, leaving only the resistance R. Thus, at resonance, the impedance is:

$$Z = R$$

This is the minimum impedance, so the correct answer is:

$$\boxed{(A)\text{ Minimum}}$$

Quick Tip

At resonance in an RLC circuit, the impedance is at its minimum because the reactances of the inductor and capacitor cancel each other out.

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4. The efficiency of a Carnot engine depends on:

(A) Temperature of the hot reservoir

(B) Temperature of the cold reservoir

(C) Both A and B

(D) None of the above

Correct Answer: (C) Both A and B

Solution:

The efficiency of a Carnot engine is given by the formula:

$$\eta = 1 - \frac{T_c}{T_h}$$

where T_h is the temperature of the hot reservoir and T_c is the temperature of the cold reservoir (both in Kelvin). Therefore, the efficiency depends on both the temperature of the hot reservoir and the cold reservoir. The greater the difference between T_h and T_c, the higher the efficiency. Thus, the correct answer is:

$$\boxed{(C)\text{ Both A and B}}$$

Quick Tip

Remember that the efficiency of a Carnot engine increases with the temperature difference between the hot and cold reservoirs.

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5. The modulus of elasticity of concrete is influenced by:

(A) Age of concrete

(B) Type of aggregate

(C) Water-cement ratio

(D) All of the above

Correct Answer: (D) All of the above

Solution:

The modulus of elasticity of concrete depends on several factors, including: 1. Age of concrete: As concrete ages, its modulus of elasticity increases due to the continued hydration of cement particles.

2. Type of aggregate: The nature and properties of the aggregate (e.g., density, type) influence the overall stiffness of the concrete.

3. Water-cement ratio: A lower water-cement ratio leads to higher concrete strength and stiffness, thus increasing the modulus of elasticity.

Since all of these factors affect the modulus of elasticity, the correct answer is:

$$\boxed{(D) \text{ All of the above}}$$

Quick Tip

For concrete, a lower water-cement ratio and the right choice of aggregate result in a higher modulus of elasticity.

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6. In a batch reactor, the reaction rate is:

(A) Constant

(B) Decreases with time

(C) Increases with time

(D) Zero

Correct Answer: (B) Decreases with time

Solution:

In a batch reactor, the concentration of reactants decreases over time as the reaction proceeds. Since the reaction rate depends on the concentration of reactants, it will decrease as the concentration of reactants decreases. Therefore, the reaction rate decreases with time, and the correct answer is:

$$\boxed{(B)\,\text{Decreases with time}}$$

Quick Tip

In batch reactors, always remember that the reaction rate decreases as reactants are consumed during the reaction.

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7. Which of the following is a method of gene transfer in plants?

(A) Agrobacterium-mediated transformation

(B) Electroporation

(C) Microinjection

(D) All of the above

Correct Answer: (D) All of the above

Solution:

Gene transfer in plants can be achieved using several methods, including:

1. Agrobacterium-mediated transformation: A natural method where Agrobacterium tumefaciens is used to transfer genes into plant cells.

2. Electroporation: A method where plant cells are exposed to an electric field to facilitate gene uptake.

3. Microinjection: A method where DNA is directly injected into plant cells using a fine needle.

Thus, all of these are valid methods for gene transfer in plants. Therefore, the correct answer is:

$$\boxed{(D)\ \text{All of the above}}$$

Quick Tip

Agrobacterium-mediated transformation is the most common method used in genetic engineering of plants.

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8. The first-pass metabolism refers to:

(A) Drug metabolism in the liver before reaching systemic circulation

(B) Drug absorption in the gastrointestinal tract

(C) Drug excretion through the kidneys

(D) Drug distribution to tissues

Correct Answer: (A) Drug metabolism in the liver before reaching systemic circulation

Solution:

The first-pass metabolism refers to the process where drugs are metabolized in the liver before they reach the systemic circulation. After absorption through the gastrointestinal tract, drugs are carried by the portal vein to the liver, where they may be metabolized, thus reducing the concentration of the drug before it reaches the bloodstream. Therefore, the correct answer is:

$$\boxed{(A)\ \text{Drug metabolism in the liver before reaching systemic circulation}}$$

Quick Tip

First-pass metabolism significantly reduces the bioavailability of orally administered drugs.

9. The term 'Feng Shui' is associated with:

(A) Urban planning

(B) Environmental psychology

(C) Traditional Chinese geomancy

(D) Sustainable architecture

Correct Answer: (C) Traditional Chinese geomancy

Solution:

Feng Shui is a traditional Chinese practice that involves arranging the environment to promote balance and harmony. It is based on geomancy, the belief that the arrangement of objects can influence energy flow (Qi). Feng Shui is widely used in architecture and urban planning. Thus, the correct answer is:

$$\boxed{(C) \text{ Traditional Chinese geomancy}}$$

Quick Tip

Remember that Feng Shui is related to creating harmony with the environment based on the flow of energy.

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10. A thermocouple is used to measure:

(A) Temperature

(B) Pressure

(C) Flow

(D) Level

Correct Answer: (A) Temperature

Solution:

A thermocouple is a device used to measure temperature. It consists of two dissimilar metal wires joined at one end, which generates a voltage proportional to the temperature difference

between the two ends. The thermocouple is commonly used in temperature sensing applications. Therefore, the correct answer is:

$$\boxed{(A)\ \text{Temperature}}$$

Quick Tip

Thermocouples are commonly used in industrial applications for measuring high temperatures.
