MHT CET 2025 PCM 26 April Shift 2 Question Paper

Time Allowed :3 Hour	Maximum Marks :200	Total Questions :150

1. Given the vectors:

$$\mathbf{a} = i + 3j - k, \quad \mathbf{b} = 3i - j + 2k, \quad \mathbf{c} = i + 2j - 2k$$

and the following information:

$$\frac{\mathbf{a} \cdot \mathbf{c}}{|\mathbf{c}|} = \frac{10}{3}$$

Find the value of $\alpha + \beta$ and the projection of $\mathbf{a}$ on $\mathbf{c}$.

(A) $\alpha + \beta = 30°$, Projection of $\mathbf{a}$ on $\mathbf{c} = 5$

(B) $\alpha + \beta = 45°$, Projection of $\mathbf{a}$ on $\mathbf{c} = 4$

(C) $\alpha + \beta = 60°$, Projection of $\mathbf{a}$ on $\mathbf{c} = 6$

(D) $\alpha + \beta = 90°$, Projection of $\mathbf{a}$ on $\mathbf{c} = 7$

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2. A medicine compound having an amide linkage was asked. Which of the following compounds contains an amide linkage?

(A) Acetanilide

(B) Aspirin

(C) Benzene

(D) Acetic acid

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3. Which is the weakest ligand?

(A) F^-

(B) EDTA

(C) en

(D) CO

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4. What is the product obtained on the reaction of chlorobenzene with concentrated HNO3?

(A) Para nitro chloro benzene

(B) Ortho nitro chloro benzene

(C) Mixture of ortho and para nitro benzene

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5. Find the radius of a BCC molecule having an edge length of 2.0×10^{-11} m.

(A) 1.0×10^{-11} m

(B) 1.5×10^{-11} m

(C) 2.0×10^{-11} m

(D) 3.0×10^{-11} m

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6. Which of the following elements shows a +4 oxidation state with the given configuration?

(A) Ce

(B) Tb

(C) Eu

(D) Lu

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7. Given the formula for depression of freezing point:

$$\Delta T_f = K_f \cdot m$$

where ΔT_f is the depression of freezing point, K_f is the freezing point depression constant, and m is the molality, calculate the value of m.

(A) $m = \frac{\Delta T_f}{K_f}$

(B) $m = \frac{K_f}{\Delta T_f}$

(C) $m = K_f \cdot \Delta T_f$

(D) $m = \frac{\Delta T_f}{K_f^2}$

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8. What is the number of unpaired electrons in Lutetium (Lu) in the +3 oxidation state?

(A) 0

(B) 1

(C) 2

(D) 3

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9. Total pressure of the solution is 500, the partial pressure of component A is 400, and the partial pressure of component B is 575. What is the mole fraction of component B?

(A) 0.5

(B) 0.6

(C) 0.8

(D) 0.9

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10. Which of the following elements has the most electronegativity: Li, Na, K, or Rb?

(A) Li

(B) Na

(C) K

(D) Rb

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11. Which of the following has the lowest boiling point?

(A) Butanol

(B) Propanol

(C) Ethanol

(D) Methanol
