MHT CET 2024 Mathematics Memory Based Question Paper PDF

Ques 1. If $B = \begin{bmatrix} 3 & \alpha & -1 \\ 1 & 3 & 1 \\ -1 & 1 & 3 \end{bmatrix}$ is the adjoint of a 3×3 matrix A and $|A| = 4$, then α is equal to:

(A) 1
(B) 0
(C) -1
(D) -2

Ques 2. What is the IUPAC name of the ether with the formula $CH_3 - O - C_2H_5$?

(A) Methoxy ethane
(B) Ethoxy methane
(C) Dimethyl ether
(D) Ethyl methyl ketone

Ques 3. If $A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$, then A^{-1} is equal to:

(A) $\frac{1}{2}\begin{bmatrix} 0 & 1 & 2 \\ 3 & 2 & 1 \\ 4 & 2 & 3 \end{bmatrix}$
(B) $\begin{bmatrix} 1/2 & -1/2 & 1/2 \\ -4/2 & 3 & -1 \\ 5/2 & -3/2 & 1/2 \end{bmatrix}$
(C) $\begin{bmatrix} 1/2 & -1 & 5/2 \\ 1 & -6 & 3 \\ 1 & 2 & -1 \end{bmatrix}$
(D) $\frac{1}{2}\begin{bmatrix} 1 & -1 & -1 \\ -8 & 6 & -2 \\ 5 & -3 & 1 \end{bmatrix}$

Ques 4. Which of the following reagent sets is used for Clemmensen reduction?

(A) $Zn - Hg$/conc. HCl
(B) NH_2NH_2/KOH/ethylene glycol
(C) $LiAlH_4$/ether
(D) $NaBH_4$/ethanol

Ques 5. Which element shows the lowest oxidation state in the 3d series?

(A) Sc
(B) Ti
(C) Zn
(D) None of the above

Ques 6. Which of the following equations is used to calculate the pH of an acidic buffer?

(A) $pH = pK_a + \log \frac{[\text{salt}]}{[\text{acid}]}$

(B) $pH = pK_a - \log \frac{[\text{salt}]}{[\text{acid}]}$
(C) $pOH = pK_b + \log \frac{[\text{salt}]}{[\text{base}]}$
(D) $pH = -\log[H^+]$

Ques 7. What is the concentration of H^+ ions if the pH of the solution is 2.7?
(A) 1.99×10^{-3} M
(B) 2.0×10^{-2} M
(C) 3.1×10^{-3} M
(D) 1.5×10^{-3} M

Ques 8. According to Henry's Law, the relationship between the solubility (S) of a gas in a liquid and the external pressure (P) at constant temperature is:
(A) $S \propto P$
(B) $S \propto \frac{1}{P}$
(C) $S \propto P^2$
(D) S is independent of P

Ques 9. How many unit particles (atoms) are present in a Body-Centered Cubic (BCC) unit cell?
(A) 2
(B) 1
(C) 4
(D) 3

Ques 10. The most suitable reagent for the controlled conversion of $R-CH_2-OH$ to $R-CHO$ is:
(A) PCC (Pyridinium Chlorochromate)
(B) $KMnO_4/H^+$
(C) $K_2Cr_2O_7/H_2SO_4$
(D) $LiAlH_4$

Ques 11. The edge length (a) of a Body-Centered Cubic (BCC) unit cell in terms of the radius (r) of the atom is:
(A) $a = \frac{4r}{\sqrt{3}}$
(B) $a = 2\sqrt{2}r$
(C) $a = 2r$
(D) $a = \frac{\sqrt{3}r}{4}$

Ques 12. Which of the following is considered a Preliminary Test for Nanoparticles?
(A) X-ray diffraction
(B) Scanning of neutron
(C) Scanning of electron
(D) None of these

Ques 13. The general IUPAC naming convention for a Haloarene is:
(A) "halo-" + parent hydrocarbon name
(B) parent hydrocarbon + "-halide"
(C) "alkoxy-" + parent hydrocarbon

(D) "hydroxy-" + parent hydrocarbon

Ques 14. The converse of the statement $((\sim p) \wedge q) \Rightarrow r$ is:
(A) $((\sim p) \vee q) \Rightarrow r$
(B) $(\sim r) \Rightarrow p \wedge q$
(C) $(p \vee (\sim q)) \Rightarrow (\sim r)$
(D) $r \Rightarrow ((\sim p) \wedge q)$

Ques 15. The negation of $(p \wedge (\sim q)) \vee (\sim p)$ is equivalent to:
(A) $p \wedge q$
(B) $p \wedge (\sim q)$
(C) $p \wedge (q \wedge (\sim p))$
(D) $p \vee (q \vee (\sim p))$

Ques 16. Find the variance of the following probability distribution:

x	0	1	2
$P(X)$	9/16	3/8	1/16

(A) 1/8
(B) 5/8
(C) 1/4
(D) 3/8