JEE Main – 02nd April – 2025 (Shift-1)

[Memory Based Questions]

PHYSICS

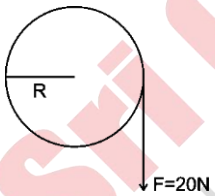
1. What are the dimensions of viscosity, intensity of wave and pressure gradient

(a) $[M^1L^{-1}T^{-1}]$, $[M^1L^0T^{-3}]$, $[M^1L^{-2}T^{-2}]$ (b) $[M^1L^0T^{-2}]$, $[M^0L^1T^{-1}]$, $[M^2L^{-1}T^{-1}]$

(c) $[M^0L^{-2}T^{-2}]$, $[M^2L^1T^{-1}]$, $[M^0L^{-1}T^{-1}]$ (d) $[M^2L^{-2}T^{-2}]$, $[M^1L^2T^{-1}]$, $[M^0L^{-1}T^{-2}]$

Ans: (a)

2. $M = 10\ kg, R = 10\ cm$. What is ω when the string is unwounded by 1 m



(a) $20\sqrt{2}$ (b) $40\sqrt{2}$ (c) $60\sqrt{2}$ (d) $80\sqrt{2}$

Ans: (a)

3. The ratio of magnetic field to center of circular coil to magnetic field at distance x from the centre of circular coil $\left(\frac{x}{R} = \frac{3}{4}\right)$

(a) $\frac{74}{135}$ (b) $\frac{44}{125}$ (c) $\frac{64}{125}$ (d) $\frac{34}{115}$

Ans: (c)

4. Relation between magnetic susceptibility and magnetic permeability

(a) $\mu = \mu_0(1 - \chi_m)$ (b) $\mu = \mu_0(2 + \chi_m)$ (c) $\mu = \mu_0(5 + \chi_m)$ (d) $\mu = \mu_0(1 + \chi_m)$

Ans: (d)

5. A plane polarized light entering according to equation $x + y + z =$ constant. angle made with x-axis is

(a) $\sin^{-1}(\frac{1}{\sqrt{3}})$ (b) $\cos^{-1}(\frac{1}{\sqrt{3}})$ (c) $\cos^{-1}(\frac{1}{\sqrt{4}})$ (d) $\sin^{-1}(\frac{1}{\sqrt{4}})$

Ans: (b)

6. A body travels with x distance with 5 m/s, and next distance $\frac{3x}{2}$ with v_2 m/s, If average speed is $\frac{50}{7}$ m/s, then v_2 = ?

(a) 8 m/s (b) 4 m/s (c) 6 m/s (d) 10 m/s

Ans: (d)

7. MOI of rod about centre of mass is α. It is cut into half length and it is adjusted into cross shape. The MOI to the centre is

(a) $\frac{\alpha}{6}$ (b) $\frac{\alpha}{2}$ (c) $\frac{\alpha}{4}$ (d) $\frac{\alpha}{3}$

Ans: (c)

9. The dimensional formula of ab^{-2} for equation $\left(P+\frac{a}{v^2}\right)(v-b)=RT$ is

(a) $[M^1L^{-1}T^{-2}]$ (b) $[M^1L^{-1}T^{-1}]$ (c) $[M^0L^{-1}T^{-1}]$ (d) $[M^1L^0T^{-1}]$

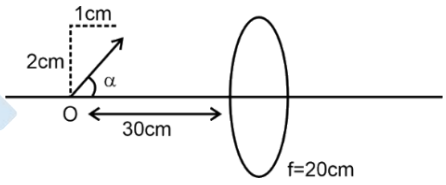
Ans: (a)

10. A has 3 degrees of freedom and B has 6 degrees of freedom. What is the ratio of γ ?

(a) $\frac{4}{3}$ (b) $\frac{5}{2}$ (c) $\frac{5}{4}$ (d) $\frac{6}{2}$

Ans: (c)

11. The tan of angle made by image with principle axis is



Ans: 1

12. A particle is subjected to two SHM as $x_1=\sqrt{2}\sin 5t$ cm, $x_2=2\sqrt{2}\sin\left(5t+\frac{\pi}{3}\right)$ cm, x = displacement, t = time period, the maximum accelaration of particle is $x\times10^{-2}$ ms^{-2}. The value of x is

(a) $25\sqrt{14}$ (b) $3\sqrt{7}$ (c) $25\sqrt{7}$ (d) $3\sqrt{14}$

Ans: (a)

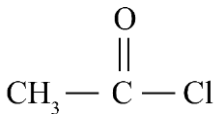
13. A point charge $+q$ is placed at origin. A second point charge $+9q$ is placed at $(d, 0,0)$ in cartesian coordinate system. The point in between them where the electric field vanishes is

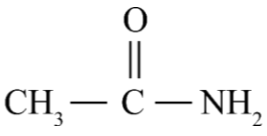
(a) (d/3, 0, 0) (b) (3d/4, 0, 0) (c) (4d/3, 0, 0) (d) (d/4, 0, 0)

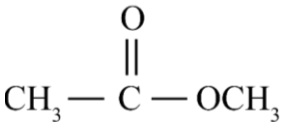
Ans: (d)

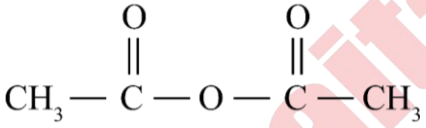
CHEMISTRY

1. Which of the following molecules hydrolyses fast?

a) 

b) 

c) 

d) 

Ans: (a)

2. Which does not follow general trends among Halogens?

(a) I.E (b) Electro Affinity (c) Ionic Radius (d) Covalent Radius

Ans: (b)

3. Which of the following is correct order of basic strength of amines in aqueous medium?

(a) $CH_3NH_2 > (CH_3)_2NH > (CH_3)_3N > NH_3$

(b) $(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N > NH_3$

(c) $CH_3NH_2 > NH_3 > (CH_3)_2NH > (CH_3)_3N$

(d) $(CH_3)_3N > (CH_3)_2NH > CH_3NH_2 > NH_3$

Ans: (b)

4. Which of the following statement(s) is/are correct for the adiabatic process?

A. Molar heat capacity is zero.

B. Molar heat capacity is infinite.

C. Work done on gas is equal to increase in internal energy

D. The increase in temperature results in decrease in internal energy

(a) A and C Only (b) B and C Only (c) A and D Only (d) C and D Only

Ans: (a)

5. Vapour pressure of pure liquid A is 200 mm Hg . If 1 mol of A and 3 mol of B are mixed. Assuming solution to be ideal, find the vapour pressure of pure liquid 'B', if total pressure of solution is 500 mm Hg

(a) 500 (b) 200 (c) 700 (d) 600

Ans: (d)

6. **Statement - I**: Metallic nature of Al is less than Ga
Statement - II: Ionic radius of Al^{+3} is less than Ga^{+3}

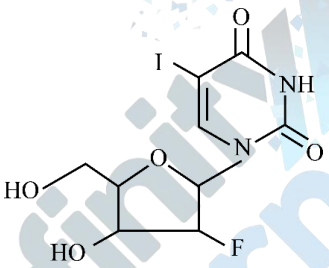
(a) Both statement I and statement II are incorrect
(b) Statement I is incorrect but statement II is correct
(c) Both statement I and statement II are correct
(d) Statement I is correct but statement II is incorrect

Ans: (a)

7. **Statement - I**: If $\Delta_o < P$ high spin complex are formed
Statement - II: In tetrahedral low spin complexes are rare as $\Delta_o < P$

(a) Both statement I and statement II are incorrect
(b) Statement I is incorrect but statement II is correct
(c) Both statement I and statement II are correct
(d) Statement I is correct but statement II is incorrect

Ans: (c)

8. 

The weight of 0.1 mole of the above compound is $x \times 10^{-3}$. Find x (nearest integer)

Ans: 4

9. 100 g $CaCO_3$. When reacted with 0.19 mole of HCl then the moles of $CaCl_2$ is $P \times 10^{-3}$ mol. Find P ?

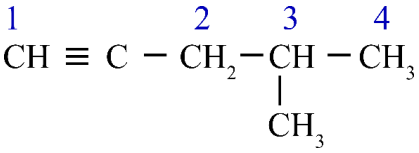
(a) 95 (b) 65 (c) 72 (d) 84

Ans: (a)

10. For the combustion of a hydrocarbon of 1g gives 1.46g of CO_2, 0.56 g H_2O. Calculate the empirical formula of the compound?

(a) CH_4 (b) CH_2 (c) C_2H_4 (d) C_3H_6

Ans: (b)

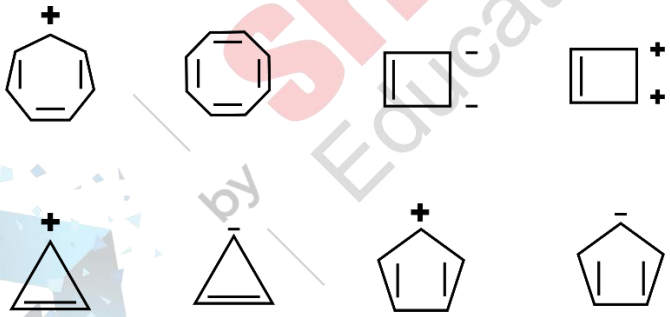
11. 

During homolysis of the above compound which position will form more stable and least stable free radical respectively?

(a) 1 and 2 (b) 2 and 4 (c) 3 and 1 (d) 3 and 2

Ans: (c)

12. Find the total no.of aromatic and non-aromatic compounds



(a) 8 (b) 2 (c) 4 (d) 6

Ans: (d)

13. (i) All amino acids are optically active
(ii) All naturally occurring amino acid have at least one chiral center except glycine.
(iii) Glutamic acid is the only amino acid which has −COOH group in its side chain.
(iv) The amino acid cystine undergo hydrolysis faster due to −SH group.

Find the **incorrect** statement(s).

(a) i and iii (b) i and ii (c) iii and iv (d) All are Incorrect.

Ans: (a)

14. 1) $Zn^{2+} + K_4[Fe(CN)_6] \longrightarrow Zn_2[Fe(CN)_6]$ = Bluish white

2) $Cu^{2+} + K_4[Fe(N)_6] \longrightarrow Cu_2[Fe(CN)_6]$ = Chocolate brown

3) $Fe^{3+} + K_4[Fe(N)_6] \rightarrow Fe_4[Fe(N)_6]_3$ = Prussian blue

Which of the above reaction and the product colors are correct?

(a) 1 and 3 correct (b) 1 and 2 correct

(c) 3 and 2 correct (d) All are correct.

Ans: (d)

15. Among the given compounds NH_3, NF_3, ClF_3, XeF_2, SO_2. Find the hybridization of compound which is polar and has highest no.of lone pair on central atom.

(a) sp^3d^2 (b) sp^3d (c) sp^3d^3 (d) sp^3

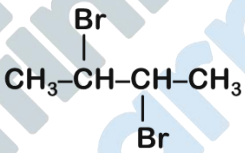
Ans: (b)

16. AX_4Y
A is rarest monoatomic p block element
X is highest electro negative element in the periodic table
Y is 2nd most electro negative element in the periodic table
Find hybridization of the compound.

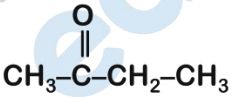
(a) sp^3d^2 (b) sp^3d (c) sp^3d^3 (d) sp^3

Ans: (a)

17. $CH_3–CH=CH-CH_3 + Br_2 \xrightarrow{CCl_4} A \xrightarrow[excess]{NaNH_2} B \xrightarrow{Hg^{+2}/H_2SO_4} C$. Find C.

(a) 

(b) $CH_3–C\equiv C–CH_3$

(c) 

(d) None

Ans: (c)

MATHEMATICS

1. The greatest value of $n, n \in N$. If 3^n divides 50!

   a) 20 b) 21 c) 22 d) 23

   Ans: (c)

2. Find $\int_0^e |\log_e x|\, dx$

   a) e b) 3e c) 0 d) 2e

   Ans: (d)

3. Number of solutions in $[-2\pi, 2\pi]$ for equation $2\sqrt{2}\cos^2\theta + (2-\sqrt{6})\cos\theta - \sqrt{3} = 0$.

   Ans: 8

4. Probability of selecting 3 numbers from set {1, 2, 3, ...40} such that the three numbers will be in increasing G.P.

   Ans: 18

5. $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, one of the $S(\sqrt{10}, 0)$ and directrix $x = \frac{9}{\sqrt{10}}$ and e is eccentricity. Then $9(e^2 + l)$ is

   Ans: 16

6. $A + I = \begin{bmatrix} 1 & a & 1 \\ 2 & 1 & 0 \\ 1 & 1 & -2 \end{bmatrix}$, $|A| = -4$, $\left|(a-1)\,\text{adj}\big((a+1)A\big)\right| = ?$

   Ans: 0

7. $|z| = 1$, $\frac{2+k^2 z}{k+\bar{z}} = kz$, maximum distance from $k + ik^2$ to the circle $|z - (1+2i)| = 1$

   a) $\sqrt{3}+1$ b) 2 c) 3 d) $\sqrt{5}+1$

   Ans: (d)

8. Term independent of 'x' $\left[\frac{x+1}{x^{2/3}+1-x^{1/3}} - \frac{x-1}{x-x^{1/2}}\right]^{10}$; $x > 1$ is b

   Ans: 210

9. Let $p_n = \alpha^n + \beta^n$, $p_1 = 1$, $p_{10} = 123$, $p_9 = 76$, $p_8 = 47$. Find $\frac{1}{\alpha} + \frac{1}{\beta}$

   Ans: –1

10. $3x + y - z = 3$, $2x + \alpha + 2 = -3$, $x + y + \beta z = -2$, have infinite solutions then $22\beta - 9\alpha$ value is?

Ans: –1

11. If the function $f(x) = 2x^3 - 9ax^2 + 12a^2x + 1$, Where $a > 0$, attains its local maximum & minimum value at p & q, respectively, such that $p^2 = q$. Then $f(3) = ?$

a) 50 b) 10 c) 23 d) 37

Ans: (d)

12. $\frac{x^2}{18} + \frac{y^2}{9} = 1$, then $\max(sp.s'p) + \min(sp.s'p) =$

Ans: 27

13. For $\alpha, \beta, \gamma \in R, \lim_{x\to 0} \frac{x^2 \sin \alpha x + (\gamma - 1)e^{x^2}}{\sin 2x - \beta x} = 3$, than $\beta + \gamma - \alpha = ?$

a) 6 b) 4 c) 7 d) –1

Ans: (c)

14. $a_1, a_2, a_3 \ldots$ A.P. such that $\sum_{k=1}^{12} a_{2k-1} = -\frac{72}{5} a_1, a_1 \neq 0$, if $\sum_{k=1}^{n} a_k = 0$ than $n =$

a) 17 b) 11 c) 10 d) 13

Ans: (b)

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