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2025 JEE 29TH Shift -1 Questions

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JEE Main – 29th January – 2025 (Shift-1)

[Memory Based Questions]

PHYSICS

1. **Assertion (A):** At the peak of mountain, time period of pendulum increases.

   Reason (R): Time period of pendulum increases with decreasing in g.

   a) A is true and R is false
   b) A is false and R is true
   c) A is false and R is false
   d) A is true and R is true

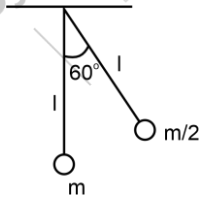
   Ans: (d)

2. The velocity of a particle moving on a straight line varies with time as $v = At^2 + \frac{Bt}{C+t}$, where A, B, C, are constants. Find the dimension of ABC.

   a) $[L^2\ T^{-2}]$
   b) $[L^2\ T^{-1}]$
   c) $[L^2\ T^{-3}]$
   d) $[LT^{-3}]$

   Ans: (c)

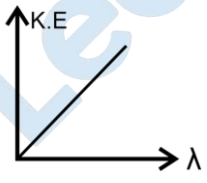
3. A pendulum of mass $\frac{m}{2}$ is released and it collides with another pendulum of mass m elastically. Find speed of another pendulum after collision.

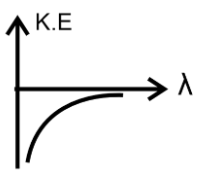


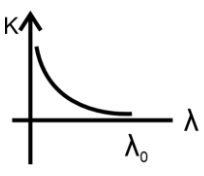
   a) $\frac{2}{3}\sqrt{gl}$
   b) $\sqrt{\frac{3}{2}gl}$
   c) $\sqrt{\frac{gl}{3}}$
   d) $\frac{1}{3}\sqrt{gl}$

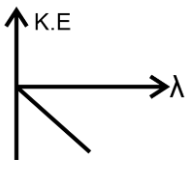
   Ans: (a)

4. The graph between wavelengths (λ) of incident light and kinetic energy (K.E.) of photoelectrons in photoelectric effect is

   a) 

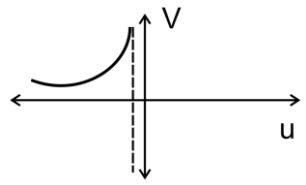
   b) 

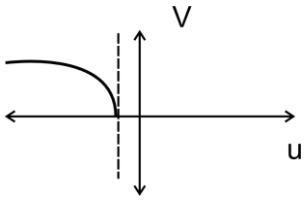
   c) 

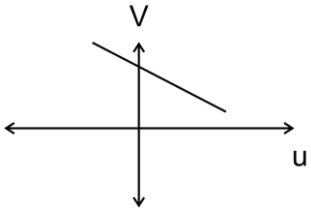
   d) 

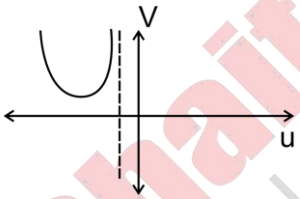
   Ans: (c)

5. For a convex lens having $|u| > f$ where f is focal length. Graph between v&u is

a) 

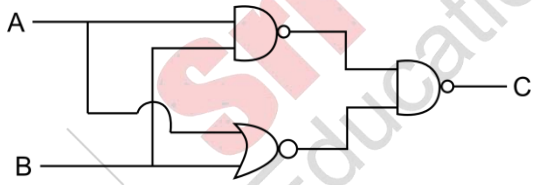
b) 

c) 

d) 

Ans: (a)

6. Identify the logic gate represented by the circuit shown below.



a) OR Gate b) NAND Gate c) AND Gate d) NOR Gate

Ans: (a)

7. A river is flowing with speed 9 km/h. Boat is going downstream-speed of boat in still water is 27 km/h. A person in boat throws a ball upwards with speed 10 m/s. Find range of the ball as seen by an observer at bank of river

a) 10 m b) $20\sqrt{3}$ m c) 25 m d) 20 m

Ans: (d)

8. **Statement-1:** Electromagnetic wave have both energy and momentum.

Statement-2: Rest mass of photon is zero.

a) Statement-1 is true and Statement-2 is false

b) Statement-1 is false and Statement-2 is true

c) Statement-1 is false and Statement-2 is false

d) Statement-1 is true and Statement-2 is true

Ans: (d)

9. A ball falling in a sea of depth 2.5 km shows x% decrease in its volume at the bottom. The bulk modulus of material of ball is $2 \times 10^9 \frac{N}{m^2}$. Find '$x$'

a) 0.57% b) 1.25% c) 2.57% d) 3.21%

Ans: (b)

10. A charged particle of charge 'q' and mass 'm' is connected with a string of length 'l' in an electric field of intensity 'E_0'. What will be the time period of small oscillations

a) $T = 2\pi\sqrt{\frac{ml}{Eq}}$ b) $T = 2\pi\sqrt{\frac{2ml}{qE}}$ c) $T = \frac{1}{2\pi}\sqrt{\frac{ml}{Eq}}$ d) $T = \frac{1}{2\pi}\sqrt{\frac{2ml}{Eq}}$

Ans: (a)

11. Two projectiles were launched from same position simultaneously only same speed on of the projectile was launched at angle $(45 - \alpha)^\circ$ and the other at an angle of $(45 + \alpha)^\circ$. Find the ratio of maximum height of the projectile.

a) $\frac{1-\sin 2\alpha}{1+\sin 2\alpha}$ b) $\frac{1-\tan \alpha}{1+\tan \alpha}$ c) $\frac{1-\cos \alpha}{1+\cos \alpha}$ d) $\frac{1-\sin \alpha}{1+\sin \alpha}$

Ans: (a)

12. Which physical quantities have same dimensions

a) Angular momentum and planck's constant

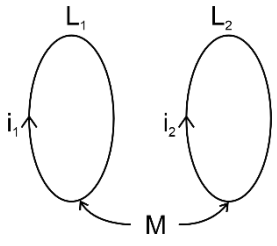
b) Torque and moment of inertia

c) Impulse and surface tension

d) Momentum and work done

Ans: (a)

13. Two coils having self-inductance L_1 and L_2 are placed closely such that they have a mutual inductance M. If they carry currents i_1 and i_2 as shown in the figure than the induced emf in coil 1 is

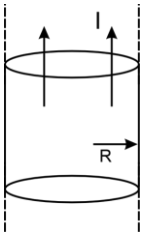


a) $-L_1\left(\frac{di_1}{dt}\right) + M\left(\frac{di_2}{dt}\right)$ b) $-L_1\left(\frac{di_1}{dt}\right) - M\left(\frac{di_2}{dt}\right)$

c) $-L_1\left(\frac{di_2}{dt}\right) + M\left(\frac{di_1}{dt}\right)$ d) $-L_1\left(\frac{di_2}{dt}\right) - M\left(\frac{di_1}{dt}\right)$

Ans: (b)

14. An infinite solid cylindrical wire of radius R carries a current I uniformly distributed along its area. The distance from the center where the magnetic field is equal to $\frac{\mu I}{4\pi R}$ is



a) R b) $R/2$ c) $4R$ d) Zero

Ans: (b)

CHEMISTRY

1. Which of the following is animal starch?

   a) Glycogen b) Lactose c) Amylopectin d) Amylose

   Ans: (a)

2. Given below are two statements:

   Statement-I : Correct order of ionic radius for Mg^{2+}, Na^{+}, O^{2-} & F^{-} is $F^{-} > O^{2-} > Na^{+} > Mg^{2+}$

   Statement-II : Correct order of magnitude of gain Enthalpy for 17^{th} group follows order Cl > F > Br > I (Magnitude only)

   In the light of the above statements, choose the most appropriate answer from the options given below:

   a) Both Statement I and Statement II are incorrect

   b) Statement I is correct but Statement II is incorrect

   c) Both Statement I and Statement II are correct

   d) Statement I is incorrect but Statement II is correct

   Ans: (d)

3. Calculate the total number of sigma and π bond in the given molecule?

   Ans: 15

4. Chromite ore $+Na_2CO_3 + O_2 \rightarrow$ insoluble product containing Fe Calculate the molar mass of insoluble product formed.

   (Given : Molar mass of Cr = 52 g/mol, Na = 23 g/mol, Fe = 56 g/mol, 0 = 16 g/mol)

   Ans: 160

5. Consider the following complexes

   $[Mn(CN)_6]^{4-}[Fe(CN)_6]^{4-}[Fe(CN)_6]^{3-}[Co(CN)_6]^{3-}$

   (1) (2) (3) (4)

   Correct order of CFSE (Δ_0) will be

   a) 3 > 4 > 2 > 1 b) 4 > 3 > 2 > 1

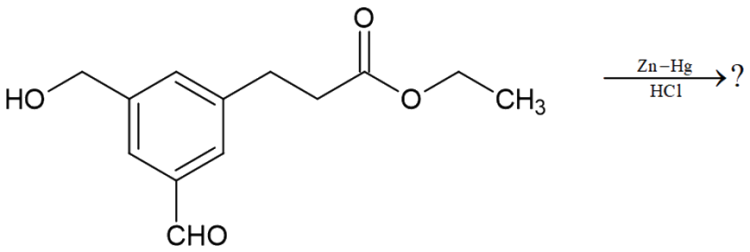
   c) 4 > 3 > 2 > 1 d) 3 > 4 > 1 > 2

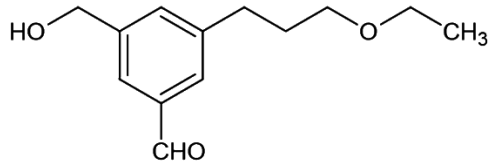
   Ans: (b)

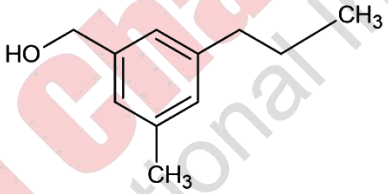
6. What is the value of van't Hoff factor for A_2B is 30% of A_2B is dissociated?

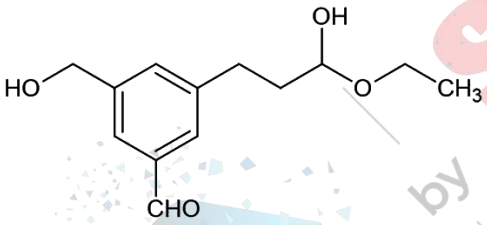
a) 1.60 b) 1.30 c) 1.50 d) 1.20

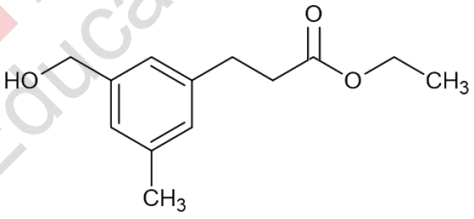
Ans: (a)

7. 

a) 

b) 

c) 

d) 

Ans: (d)

8. Find the order of the reaction

$A + B \rightarrow F$

if the mechanism of the reaction is given below:

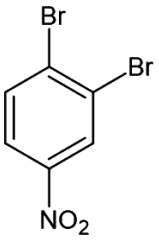
Step 1: $A + B \rightarrow D$ (slow)

Step 2: $D \rightarrow C + E$ (fast)

Step 3: $C + E \rightarrow F$ (fast)

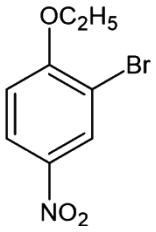
a) 1 b) 3 c) 2 d) 4

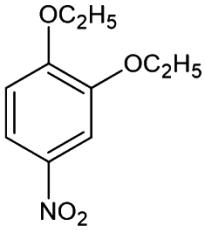
Ans: (c)

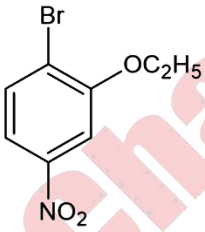
9. 

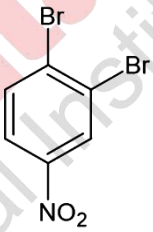
$\xrightarrow[C_2H_5OH]{C_2H_5ONa}$ Product

Find Product?

a) 

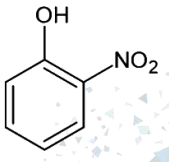
b) 

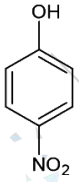
c) 

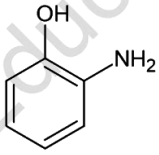
d) 

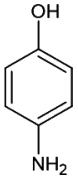
Ans: (c)

10. Among the following which are steam volatile

a) 

b) 

c) 

d) 

Ans: (a)

11. Which of the following ions is strongest oxidizing agent

Given :

$E^0_{Al^{3+}/Al} = -2.7$ V

$E^0_{Cu^{2+}/Cu} = 0.34$ V

$E^0_{Pb^{4+}/Pb^{2+}} = 1.8$ V

$E^\circ_{Ti^{3+}/Ti} = -1.21$ V

a) Al^{3+} b) Cu^{2+} c) Pb^{4+} d) Ti^{3+}

Ans: (c)

12. Given ionization enthalpy of element $E_{(g)}$ is 300 kJ/mol and electron gain enthalpy of A, B, C and D gases atoms are −320 kJ/mol, −340 kJ/mol, −200 kJ/mol and −250 kJ/mol, then what will be the correct order of ionic nature of compounds?

a) EB > EA > ED > EC
b) EB > EA > EC > ED
c) EC > ED > EA > EB
d) EC > ED > EB > EA

Ans: (a)

13. Consider the graph between Λ_m vs $\sqrt{c}$ for weak electrolyte. Correct statement is

a) Λ_m decreases sharply with increases in concentration
b) Λ_m increases sharply with increase in concentration
c) At infinite dilution, there is a small increase in Λ_m
d) At infinite dilution, there is a small decrease in Λ_m

Ans: (a)

14. What is the correct Nernst equation representation for the following cell reaction

$Mg(s) \rightarrow Mg^{2+} + 2e^-$
$Ag^+ + e^- \rightarrow Ag(s)$

a) $E_{cell} = E^*_{cell} - \frac{RT}{nF}\ln\frac{[Mg^{2+}]}{[Ag^+]^2}$
b) $E_{cell} = E^*_{cell} - \frac{RT}{nF}\ln\frac{[Ag^+]^2}{[Mg^{2+}]}$
c) $E_{cell} = E^\circ_{cell} + \frac{RT}{nF}\ln\frac{[Mg^{2+}]}{[Ag^+]}$
d) $E_{cell} = E^0_{cell} + \frac{RT}{nF}\ln\frac{[Ag^+]}{[Mg^{2+}]}$

Ans: (a)

15. Match the following List-I with List-II.

List-I		List-II	
(A)	$[Co(ox)_3]^{3-}$	(i)	sp^3d^2
(B)	$[FeF_6]^{3-}$	(ii)	d^2sp^3
(C)	$[Ni(CO)_4]$	(iii)	dsp^2
(D)	$[PtCl_4]^{2-}$	(iv)	sp^3

Choose the correct answer from the options given below:

a) (A)-(i), (B)-(ii), (C)-(iii), (D)-(iv)
b) (A)-(ii), (B)-(i), (C)-(iv), (D)-(iii)
c) (A)-(i), (B)-(ii), (C)-(iv), (D)-(iii)
d) (A)-(ii), (B)-(i), (C)-(iii), (D)-(iv)

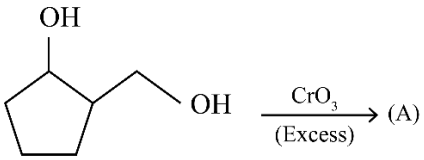
Ans: (d)

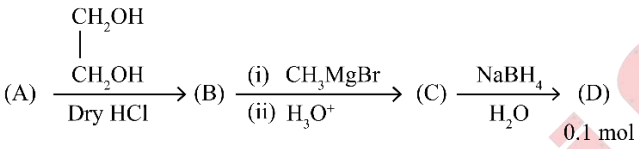
16. The correct order of melting point of d-block elements is :

a) Fe > Mn b) Tc > Ru c) Ta > W d) Os > Re

Ans: (a)

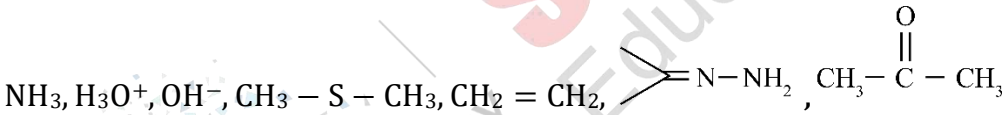
17. Consider the following reaction. Find the mass of final product(D) formed in gm (nearest integer)





Ans: 13

18. Which of the following is/are nucleophiles?



a) 7 b) 5 c) 6 d) 4

Ans: (c)

MATHEMATICS

1. $80\int_0^{\frac{\pi}{2}} \frac{\sin x+\cos x}{9+16\sin 2x}dx$

a) 2 log 5 b) 8 log 3 c) 3 log 8 d) 2 log 3

Ans: (b)

2. $\bar{a} = 2i - j + 3k, \bar{b} = 3i - 5j + k$, if $\bar{a} \times \bar{c} = \bar{c} \times \bar{b}$ and $(\bar{a} + \bar{c}) \cdot (\bar{b} + \bar{c}) = 168$ then find maximum value of $|c|^2 =$

a) 154 b) 308 c) 300 d) 77

Ans: (b)

3. $L_1 = \frac{x-1}{1} = \frac{y-2}{-1} = \frac{z-1}{2}, L_2 : \frac{x+1}{-1} = \frac{y-2}{2} = \frac{z}{1}$. Let the line L_3 passes through the point (α, β, γ) perpendicular to $L_1 \& L_2$ and L_3 intersect line L_1 then $|5\alpha - 11\beta - 8\gamma|$.

a) 25 b) 18 c) 16 d) 20

Ans: (a)

4. $|z_1 - 8 - 2i| \leq 1$ and $|z_2 - 6 + 8i| \leq 2$ then minimum value of $|z_1 - z_2|$ is equal to

a) $2\sqrt{25}+3$ b) $4\sqrt{21}+5$ c) $2\sqrt{26}-3$ d) $4\sqrt{21}-5$

Ans: (c)

5. The minimum value of n for which the number of integer terms in the binomial expansion of $(7^{1/3} + 11^{1/2})$ is 183, is

Ans: 2184

6. In and A.P. $S_3 = 54$ and S_{20} lies between 1600 and 1800 and if the common difference in this A.P. is an integer. Then find 11^{th} term of this A.P.

a) 69 b) 72 c) 45 d) 90

Ans: (d)

7. $\lim_{n\to\infty} \sum_{k=1}^{n} \frac{k^3+6k^2+11k+5}{(k+3)!} =$

a) 1/5 b) 2/3 c) 5/3 d) 1/3

Ans: (c)

8. Area bounded by the curves $2y \geq x^2 + 3, y \geq |x-1| \& y + |x| \leq 3$ is A then find the value of 6A

a) 10 b) 12 c) 7 d) 14

Ans: (a)

9. Number of 7 digit numbers that can be made using the digits 1, 2, 3 such that sum of digits is 11?

Ans: 161

10. Let R be a relation defined on $(0,\frac{\pi}{2})$ such that $xRy \,\&\, \sec^2 x - \tan^2 y = 1$ then Relation R is

a) Equivalence b) Reflexive & transitive only

c) Symmetric & transitive only d) Neither reflexive nor transitive

Ans: (a)

11. The minimum value of p such that $\lim_{x\to 0^+} x\left(\left[\frac{1}{x}\right] + \left[\frac{2}{x}\right] + \cdots + \left[\frac{p}{x}\right]\right) - x^2\left(\left[\frac{1}{x^2}\right] + \left[\frac{2}{x^2}\right] + \cdots + \left[\frac{9}{x^2}\right]\right) \geq 1$, is equal to

Ans: 10

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