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2025 JEE 24TH Shift -2 Questions

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Sri Chaitanya ACADEMY

JEE Main – 24th January – 2025 (Shift-2)

[Memory Based Questions]

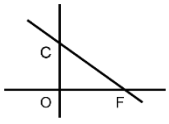
PHYSICS

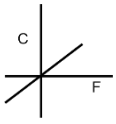
1. Arrange the following wavelengths in ascending order. Ultra violet (λ_1) Radio wave (λ_2) and X-ray (λ_3) and gamma rays (λ_4)

a) $\lambda_1 > \lambda_4 > \lambda_2 > \lambda_3$ b) $\lambda_2 > \lambda_3 > \lambda_1 > \lambda_4$ c) $\lambda_2 > \lambda_4 > \lambda_1 > \lambda_3$ d) $\lambda_4 > \lambda_3 > \lambda_2 > \lambda_1$

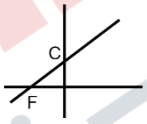
Ans: (b)

2. Which graph shows a relation between Celsius scale & Fahrenheit scale

a) 

b) 

c) 

d) 

Ans: (c)

3. Power of two sources S_1 & S_2 are in ratio 2:1 and 2×10^{15} photons per sec of 600 nm from S1 are emitted and find the number of photons per second emitted of 300 nm from S_2

a) 1.5×10^{14} b) 7×10^{14} c) 6×10^{14} d) 5×10^{14}

Ans: (d)

4. If the given acceleration due to gravity of earth is g, and its radius is reduced to $\frac{1}{3}rd$ of the original, mass remains unchanged. Now find the acceleration due to gravity

a) $9g_0$ b) $8g_0$ c) $6g_0$ d) $4g_0$

Ans: (a)

5. A solid sphere, hollow sphere rolls down purely equal distances on same inclined plane then time t_1 and t_2

a) $t_1 > t_2$ b) $t_2 > t_1$ c) $t_1 = 2t_2$ d) $t_1 = t_2$

Ans: (b)

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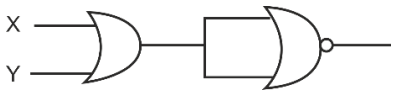
6. Find the ratio of translational kinetic energy to rotational kinetic energy of a solid sphere rolling on a horizontal surface is

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

Ans: (b)

7. The following gate represents which logic gate



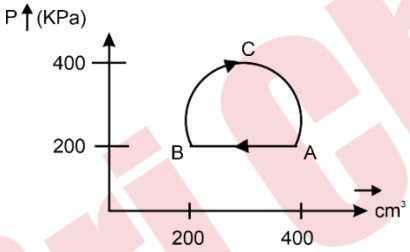
a) NOR b) OR c) AND d) NAND

Ans: (a)

8. A conical pendulum is rotating with an angular speed ω of mass m and length l. Find the tension in the string

Ans: $m\omega^2 l$

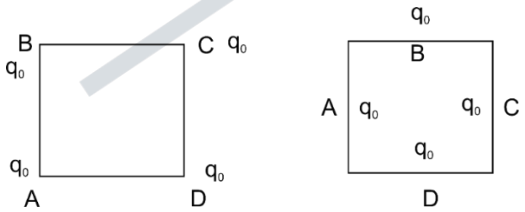
9. Find the magnitude of work done



a) 10π b) 20π c) 5π d) 15π

Ans: (a)

10. Find the change in potential energy of system of side length a in configuration 1 and 2



a) $\left(2-3\sqrt{2}\right)\frac{kq_0^2}{a}$ b) $\left(3\sqrt{2}-2\right)\frac{kq_0^2}{a}$ c) $\left(1-3\sqrt{2}\right)\frac{kq_0^2}{a}$ d) $\left(1-3\sqrt{2}\right)\frac{kq}{a}$

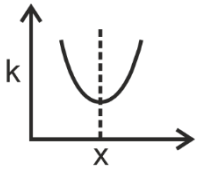
Ans: (b)

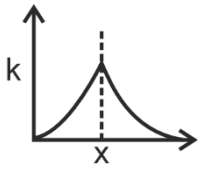
11. The position of a particle varies with time as $\vec{r} = (5t^2\hat{\imath} - 5t\hat{\jmath})$m. The magnitude and direction of velocity at $t = \frac{1}{2}$ s is

a) $5\sqrt{2}$ m/s, $-45°$ with $+X$ axis
b) 5 m/s, $-45°$ with $+X$ axis
c) $5\sqrt{2}$ m/s, $-45°$ with $+Y$ axis
d) 5 m/s, $+45°$ with $+Y$ axis

Ans: (a)

12. A particle oscillates along x-axis according to law $x = x_0\sin^2(t/2)$ where $x_0 = 1$. Variation of kinetic energy (k) with position (x) is given by graph

a) 

b) 

c) 

d) 

Ans: (c)

13. **Assertion(A):-** In a region of uniform magnetic field, an e^- is moving with constant velocity in straight line

Reason(R) :- Direction of magnetic field is along the direction of velocity

a) A and R both are true and R is correct explanation of A

b) 1A and R both are true but R is not correct explanation of A

c) A is true and R is false

d) A is false and R is true

Ans: (a)

CHEMISTRY

1. **Statement – 1:** First ionization energy Ge is greater than Si

   Statement – 2: First ionization energy Pb is greater than Sn

   a) Statement – 1 is true Statement – 2 is false

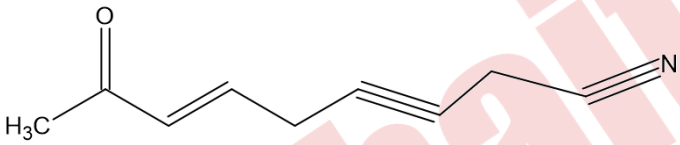
   b) Statement – 1 & Statement – 2 are false

   c) Both the Statements are true

   d) Statement – 1 is false Statement – 2 is true

   Ans: (c)

2. Find the number of sp and sp^2 are carbon atoms



   a) 2, 3 b) 3, 5 c) 4, 2 d) 3, 3

   Ans: (d)

3. Match the following Cations with respective spin magnetic moment

Ions	μ(B.M)
(A) Ti^{+3}	(p) 3.87
(B) Sc^{+3}	(q) 0
(C) V^{+2}	(r) 1.73
(D) Ni^{+2}	(s) 2.82

   a) A-s, B-q, C-p, D-r b) A-r, B-q, C-p, D-s

   c) A-r, B-p, C-q, D-s d) A-s, B-q, C-r, D-p

   Ans: (b)

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4. Match the following reactions with respective reagents

Reactions	Reagents
a) Etard reaction	p) $SnCl_2$+HCl
b) Gattermann reaction	q) CrO_2Cl_2
c) Gattermann-Koch reaction	r) Cu + HCl
d) Stephen reduction	s) CO +HCl, Anhyd.$AlCl_3$/CuCl

a) a-p, b-r, c-s, d-q
b) a-q, b-s, c-r, d-p
c) a-s, b-r, c-q, d-p
d) a-q, b-r, c-s, d-p

Ans: (d)

5. The correct order of melting point of 14^{th} group elements is :

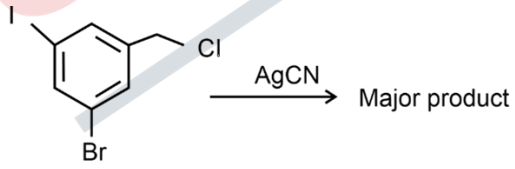
a) C>Si>Ge>Pb>Sn
b) Sn>Pb>Ge>Si>C
c) C>Si>Ge>Sn>Pb
d) C>Ge>Si>Pb>Sn

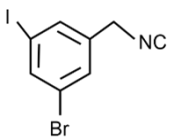
Ans: (a)

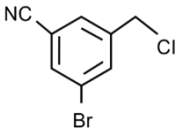
6. The conditions and Consequences that favours t_2g^3 eg^1 configuration In Octahedral metal complex is

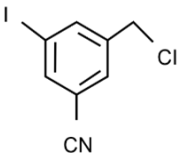
a) Strong field ligand : High spin complex
b) Strong field ligand : Low spin complex
c) Weak field ligand : High spin complex
d) Weak field ligand : Low spin complex

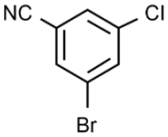
Ans: (c)

7. 

a) 

b) 

c) 

d) 

Ans: (a)

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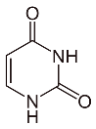
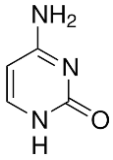
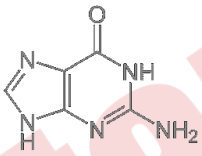
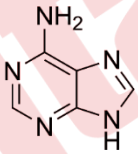
8. Match the following Nitrogenous bases with their respective structures

A) Adenine p) 

B) Guanine q) 

C) Cytosine r) 

D) Uracil s) 

a) A-p, b-r, c-q, d-s b) A-s, b-r, c-q, d-p

c) A-s, b-q, c-r, d-p d) A-r, b-s, c-q, d-p

Ans: (b)

9. When ethane 1,2-diamine is progressively added to aqueous solution of Ni(II) chloride the sequence of the colour change observed will be:

a) Violet → Blue → Pale blue → Green

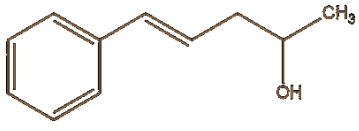
b) Pale blue → Blue → Green → Violet

c) Green → Pale blue → Blue → Violet

d) Pale blue → Blue → Violet → Green

Ans: (c)

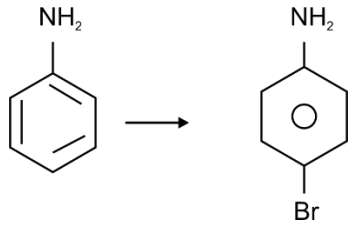
10. Number of stereoisomers for given compound?



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

Ans: (b)

11. Above conversion can be done by using which reagents among the following



a) Fe/Br_2, $H_2O(\Delta)$, H_2SO_4 b) Ac_2O, H_2SO_4, Br_2, NaOH

c) Ac_2O, Fe/Br_2, H_2O/H^+ d) Ac_2O, Br_2/Fe, NaOH

Ans: (c)

12. In a compound contains 54.2% carbon, 9.2% of hydrogen and rest are oxygen. What is molecular formula of compound, if molecular mass is 132 g/mol.

a) $C_6H_{12}O_3$ b) $C_4H_{12}O_3$ c) $C_4H_{12}O_6$ d) $C_6H_{13}O_6$

Ans: (a)

13. A hydrocarbon X which has molar mass 80 g contains 90% carbon. Find degree of unsaturation in X

a) 1 b) 5 c) 7 d) 3

Ans: (d)

14. Which of the following yellow coloured

a) NiS b) CdS c) MnS d) ZnS

Ans: (b)

15. Consider the following statements :

Statement-1 : Oxygen-oxygen bond length in O_3 is greater than O_2.

Statement-II : $O-O$ bond order in O_3 is 1.5 and $O-O$ bond order in O_2 is 2 .

a) Both Statement-I and Statement-II are correct

b) Both Statement-I and Statement-II are incorrect

c) Statement-I is correct, Statement-II is incorrect

d) Statement-I is incorrect, Statement-II is

Ans: (a)

16. The successive ionisation energy (I.E.) of an element 'X' is given

	$I.E_1$	$I.E_2$	$I.E_3$	$I.E_4$	$I.E_5$
X	500	600	2000	2200	2600

Data given in KJ/mol.

Find out the group number of element X .

a) Group → 3 b) Group → 14 c) Group → 2 d) Group → 13

Ans: (c)

17. Let k_1, k_2 and k_3 be the rate constant of reaction and $k = \sqrt{\frac{k_1 k_3}{k_2}}$. Then find activation energy of overall reaction.

(Given : $E_{a_1} = 10$ kJ/mol, $E_{a_2} = 30$ kJ/mol, $E_{a_3} = 60$ kJ/mol)

a) 20 b) 15 c) 30 d) 12

Ans: (a)

18. In Carius method of estimation of halogen, 0.25 g of an organic compound gave 0.16 g of AgBr. What is the percentage of bromine in the compound

(Given molar mass of Ag = 108, Br = 80)

a) 1.53 b) 12.32 c) 18.15 d) 27.23

Ans: (d)

19. The reaction between 1M base and 1M acid. In which of the following temperature rises more

a) 30mL CH_3COOH + 30 mL NaOH

b) 45mL CH_3COOH + 25 mL NaOH

c) 30mL HCl + 30 mL NaOH

d) 50mL HCl + 20 mL NaOH

Ans: (C)

MATHEMATICS

1. In Arithmetic Progression, S_n denotes sum of first n terms. If $S_{12} = 57,\ S_{40} = 1030$. Find $S_{30} - S_{10} = ?$

   a) 505 b) 510 c) 501 d) 515

   Ans: (d)

2. There is a group A of 5 boys and 3 girls and another group B of 5 boys and 6 girls. How many ways can we invite 4 boys and 4 girls for party with 5 from group A and 3 from group B.

   a) 2156 b) 1250 c) 5120 d) 3150

   Ans: (d)

3. $7 = 5 + \frac{1}{7}(5+\alpha) + \frac{1}{7^2}(5+2\alpha) + \cdots \infty$. Then α is _____

   a) 6 b) $\frac{6}{7}$ c) $\frac{1}{7}$ d) 1

   Ans: (a)

4. If system of equations $x + 2y - 3z = 2,\ 2x + \lambda y + 5z = 5,\ 4x + 3y + \mu z = 33$ has infinite solutions, then $\lambda + \mu$ is equal to

   a) $\frac{1334}{5}$ b) $\frac{1269}{5}$ c) $\frac{261}{5}$ d) $\frac{1063}{5}$

   Ans: (a)

5. Consider an event E such that a matrix of order 2×2 is invertible with entries 0 or 1. Then, $P(E)$ is (where $P(X)$ denotes the probability of event X)

   a) $\frac{5}{8}$ b) $\frac{3}{8}$ c) $\frac{1}{8}$ d) $\frac{7}{8}$

   Ans: (b)

6. Area bounded by the curves $y = e^x, y = |e^x - 1|$ and y-axis

   a) 1 b) 1 – ln2 c) 1 + ln2 d) ln2

   Ans: (b)

7. The equation of chord of the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$ with (3,1) as mid-point is

   a) $48x + 25y - 169 = 0$ b) $25x + 5y - 125 = 0$

   c) $65x + 2y - 12 = 0$ d) $45x + 4y - 135 = 0$

   Ans: (a)

8. 30^{th} & 12^{th} terms of binomial coefficient $(1+x)^{2n-1}$ are in the ratio $\frac{5}{2}$, then value of $n=?$

a) 20 b) 21 c) 14 d) 22

Ans: (b)

9. If $\int \frac{2x^2+5x+9}{\sqrt{x^2+x+1}}dx = x\sqrt{x^2+x+1}+\alpha\sqrt{x^2+x+1}+\beta\ln\left(x+\frac{1}{2}+\sqrt{x^2+x+1}\right)+C$, then $\alpha+2\beta$ equals to

a) 16 b) 18 c) 27 d) 11

Ans: (a)

10. $F(x)=\begin{vmatrix} a+\frac{\sin x}{x} & 1 & b \\ a & 1+\frac{\sin x}{x} & b \\ a & 1 & b+\frac{\sin x}{x} \end{vmatrix}$, if $\lim_{x\to 0} f(x)=\lambda+\alpha a+\beta b$ then $(\lambda+\alpha+\beta)^2=$

a) 17 b) 9 c) 13 d) 16

Ans: (d)

11. $2\cos x\frac{dy}{dx}=\sin 2x-4y\sin x\cdot\theta\in(0,\frac{\pi}{2}), f\left(\frac{\pi}{3}\right)=0$.then find $f'\left(\frac{\pi}{4}\right)+f(\pi/4)=$

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

Ans: (c)

12. A function $f:\mathbb{R}\to(-1,1)$ sue that $f(x)=\frac{2^x-2^{-x}}{2^x+2^{-x}}$. The function f is

a) Both one-one & onto b) only one one

c) Only onto d) Both many one & into

Ans: (a)

13. The number of real roots of the equation $x^2+3x+2=\text{Min}\{|x+2|,|x-3|\}$ is

a) 0 b) 1 c) 2 d) 3

Ans: (c)

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14. Let $\vec{a} = 3\hat{\imath} + 2\hat{\jmath} - \hat{k}, \vec{b} = \vec{a} \times (\hat{\imath} - 2\hat{\jmath})$ and $\vec{c} = \vec{b} \times \hat{k}$, then projection of $\vec{c} - 2\hat{\jmath}$ on $\vec{a}$ is equal to

a) $\frac{2}{\sqrt{11}}$ b) $\frac{3}{\sqrt{14}}$ c) $\frac{7}{\sqrt{11}}$ d) $\frac{5}{\sqrt{13}}$

Ans: (b

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