Sri Chaitanya ACADEMY

JEE Main – 03rd April – 2025 (Shift-2)

[Memory Based Questions]

PHYSICS

1. A magnetic dipole experiences a torque of $80\sqrt{3}$ Nm when placed in uniform magnetic field in such a way that dipole moment makes an angle of 60° with magnetic field. The potential energy of the dipole is

a) 80 b) 55 c) 20 d) -80

Ans: (d)

2. In the resonance experiment, two air column's closed at one end of 100 cm and 120 cm along, give 15 beats per second when each one is sounding in the respective fundamental nodes. The velocity of sound in the air column is.

a) 360m/s b) 220m/s c) 485m/s d) 340m/s

Ans: (a)

3. A block of mass 1 kg , moving along x axis with speed $v_i = 10$m/s enters a rough region ranging from $x = 0.1m$ to $x = 1.9$ m. The retarding fore acting on the block in this range is $F_r = -kx$ N, with $k = 10$ N/m. Then the final speed of the block as it crosses rough region is

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

Ans: (c)

4. Match the list - I with list -II

List - I		List - II	
A	Boltzmann constant	I	ML^2T^{-1}
B	Coefficient of viscosity	II	$MLT^{-3}K^{-1}$
C	Planck's constant	III	$ML^2T^{-2}K^{-1}$
D	Thermal conductivity	IV	$ML^{-1}T^{-1}$

a) A-III, B-IV, C-I, D-II b) A-I, B-II, C-III, D-IV

c) A-II, B-I, C-IV, D-III d) A-IV, B-III, C-II, D-I

Ans: (a)

5. The ratio of intensities of two coherent sources is 1: 9. The ratio of the maximum to the minimum intensities is

a) 9 : 1 b) 16 : 1 c) 8 : 1 d) 4 : 1

Ans: (d)

6. An electric bulb rated as $100W - 220V$ is connected to an ac source of rms voltage $220V$. The peak value of current through the bulb is

a) $\frac{5\sqrt{2}}{11}$ Amp b) $\frac{5\sqrt{5}}{11}$ Amp c) $\frac{5\sqrt{2}}{10}$ Amp d) $\frac{2\sqrt{2}}{11}$ Amp

Ans: (a)

7. Pressure of an ideal gas, contained in a closed vessel, is increased by 0.4% when heated by 1°C. Its initial temperature must be

a) 250K b) 280K c) 250^0C d) 300K

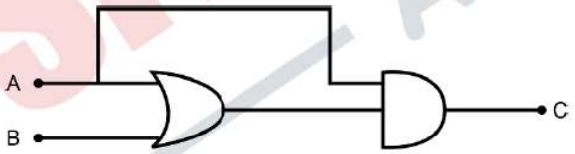
Ans: (a)

8. Two cylindrical vessels of equal cross-sectional area of $2m^2$ contain water unto heights 10m and 6m, respectively. If the vessels are connected at their bottom then the work done by the force of gravity is (Density of water is 10^3 kg/m^3 and $g = 10$ m/s^2)

a) 50,000 b) 80,000 c) 20,000 d) 10,000

Ans: (b)

9. The truth table corresponding to the circuit given below is:



a) A.B b) A c) A+B d) B

Ans: (b)

10. Excess pressure inside bubble A is half of that of bubble B. Find ratio of volume of bubble A to bubble B

a) 2:1 b) 8:1 c) 4:1 d) 1:8

Ans: (b)

11. A monochromatic light of frequency 5×10^{14} Hz travelling through air is incident on a medium of refractive index '2'. Wavelength of the refracted light will be?

a) 500 nm b) 400 nm c) 300 nm d) 600 nm

Ans: (c)

12. Physical quantity C is given as $C = \frac{pq}{r^3\sqrt{s}}$. Find the percentage change in C if percentage change in p, q, r and s are 1,1,3 and 2 respectively.

a) 18 b) 10 c) 14 d) 12

Ans: (d)

CHEMISTRY

1. Consider the following statements

Statement I: Wet cotton cloths made up of cellulose based carbo hydrate Takes comparatively longer time to get dried than wet nylon-based clothes

Statement II: Intermolecular hydrogen bonding with water molecule is more in nylon-based clothes than in cotton clothes.

In the light of above statements, choose the correct option.

a) Statement I and statement II both are correct

b) Statement I and statement II both are incorrect

c) Statement I is correct statement II is incorrect

d) Statement I is incorrect statement II is correct

Ans: (c)

2. Consider the following statements

Statement I: Hyper conjugation is not a permanent effect

Statement II: In general, greater the number of alkyl groups attached to a positively charged carbon atom greater is the hyper conjugation interaction and stabilization of the cation.

In the light of above statements, choose the correct option.

a) Statement I and statement II both are correct

b) Statement I and statement II both are incorrect

c) Statement I is correct statement II is incorrect

d) Statement I is incorrect statement II is correct

Ans: (d)

3. Fat soluble vitamin is

a) Vitamin B_1 b) Vitamin C c) Vitamin B_{12} d) Vitamin K

Ans: (d)

4. The Mass of magnesium required to produce 220 mL of hydrogen gas at STP on reaction with excess of dil. HCl is ____ (given molar mass of Mg is 24 g/mol)

a) 0.24g b) 0.36g c) 0.54g d) 0.48g

Ans: (a)

5. 

Find the IUPAC name of the compound?

a) 2-hydroxy-5-bromo-3-nitro benzenecarboxylic acid

b) 3-bromo-2-hydroxy-5-nitro benzenecarboxylic acid

c) 2-bromo-3-hydroxy-5-nitro benzenecarboxylic acid

d) 5-hydroxy-2-bromo-3-nitro benzenecarboxylic acid

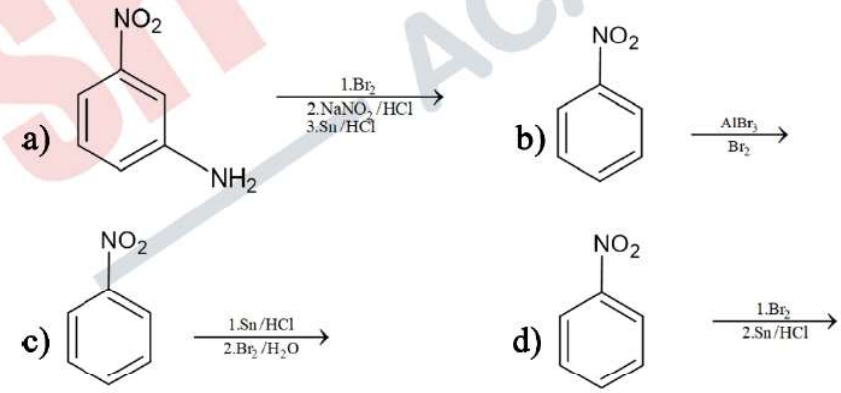
Ans: (b)

6. Among Sc, Ti, Mn and Co, Calculate the spin only magnetic moment in +2 oxidation state of metal having highest heat of atomization.

a) 3.8 b) 1.7 c) 4.9 d) 2.8

Ans: (d)

7. Which of the following reagent is used to prepare Tribromoaniline?



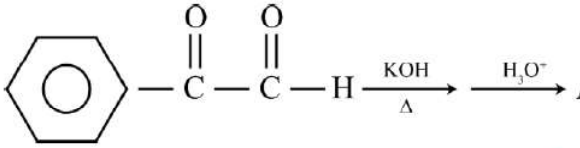
Ans: (c)

8. In Dumas method, estimation of nitrogen 0.4 g of an organic compound gave 60 ml of nitrogen. collected at 300 K temperature and 715 mm Hg pressure. The percentage composition of the compound is (Aqueous tension at 300 K = 15 mm of Hg)

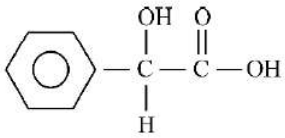
a) 10.15% b) 7.85% c) 15.71% d) 17.46%

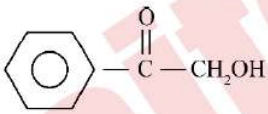
Ans: (c)

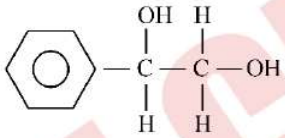
9. Consider the following reaction.

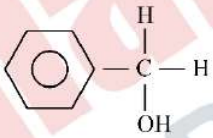


A. What is the product 'A'?

a) 

b) 

c) 

d) 

Ans: (a)

10. Match the following list-I with list-II :

List-I (Groups)		List-II (Elements)	
(A)	Pnictogens	(I)	Rn
(B)	Chalcogens	(II)	At
(C)	Halogens	(III)	Te
(D)	Noble gases	(IV)	Bi

a) A-I, B-II, C-III, D-IV b) A-IV, B-III, C-II, D-I

c) A-I, B-III, C-II, D-IV d) A-IV, B-II, C-III, D-I

Ans: (b)

11. Find orbital angular momentum for 2s and 2p energy levels

a) $0, \frac{h}{(\sqrt{2})\pi}$ b) $0, \frac{h}{\sqrt{2\pi}}$ c) $\frac{h}{\pi}, \frac{h}{\pi}$ d) $0, \frac{h}{2\pi}$

Ans: (a)

12. Which of the following order is correct?

(A) Electronegativity: B > Tl > In > Ga > Al

(B) Ionisation energy : B > Tl > Ga > Al > In

(C) Density : Tl > In > Ga > Al > B

(D) Size : B > Al > Ga > In > Al

a) (A, B, C) only b) (B, C, D) only c) (A, B, D) only d) All are correct

Ans: (a)

13. **Statement I:** CrO_3 is a strong oxidising agent

Statement II: Cr^{+6} is more stable than Mo^{+6}

In the light of above statements, choose the correct option.

a) Statement I and statement II both are correct

b) Statement I and statement II both are incorrect

c) Statement I is correct statement II is incorrect

d) Statement I is incorrect statement II is correct

Ans: (c)

14. An electron in the hydrogen atom initially in the fourth excited state makes a transition to n^{th} energy state by emitting a photon of energy 2.86 eV. The integer value of "n" is _____ (numerical)

Ans: 2

15. x grams of nitrobenzene on nitration gives 4.2 grams of dinitrobenzene then the value of x is _____ (numerical)

Ans: 3.05g

MATHEMATICS

1. If $\lim_{x\to 0}\left(\frac{\tan x}{x}\right)^{\frac{1}{x^2}} = p$, then $96 \ln p$ is

   Ans: 32

2. The distance of the point (7,10,11) from the line $\frac{x-4}{1} = \frac{y-4}{0} = \frac{z-2}{3}$ along the line $\frac{x-9}{2} = \frac{y-13}{3} = \frac{z-17}{6}$ is

   a) 12 b) 16 c) 14 d) 18

   Ans: (c)

3. The integral $\int_0^{\pi} \frac{8x\,dx}{4\cos^2 x + \sin^2 x}$ is equal to

   a) $2\pi^2$ b) π^2 c) $\frac{3\pi^2}{2}$ d) $4\pi^2$

   Ans: (a)

4. $1 + \frac{1+3}{2!} + \frac{1+3+5}{8!} + \frac{1+3+5+7}{4!} = ?$

   a) 2e b) 3e c) 6e d) 4e

   Ans: (a)

5. If the domain of the function $f(x) = \log_7\left(1 - \log_4\left(x^2 - 9x + 18\right)\right)$ is $(\alpha,\beta) \cup (\gamma,\delta)$ then $\alpha + \beta + \gamma + \delta$ is equal to

   a) 18 b) 16 c) 15 d) 17

   Ans: (a)

6. The number of solutions of the equation $(4-\sqrt{3})\sin x - 2\sqrt{3}\cos^2 x = \frac{-4}{1+\sqrt{3}}$, $x \in [-2\pi, \frac{5\pi}{2}]$

   a) 4 b) 6 c) 5 d) 3

   Ans: (c)

7. If the four distinct points (4, 6), (−1, 5), (0, 0) and $(k, 3k)$ lie on a circle of radius r, then $10K + r^2$ is equal to

   a) 33 b) 35 c) 32 d) 34

   Ans: (b)

8. The area of the region $\{(x, y): |x - y| \leq y \leq 4\sqrt{x}\}$ is

a) 512 b) $\frac{2048}{3}$ c) $\frac{512}{3}$ d) $\frac{1024}{3}$

Ans: (d)

9. The shortest distance between the curves $y^2 = 8x$ and $x^2 + y^2 + 12y + 35 = 0$ is

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

Ans: (b)

10. Let f be a function such that $f(x) + 3f\left(\frac{24}{x}\right) = 4x,\ x \neq 0$. Then $f(3) + f(8)$ is equal to

a) 12 b) 10 c) 13 d) 11

Ans: (d)

11. If $z_1, z_2, z_3 \in C$ are the vertices of an equilateral triangle, whose centroid is Z_0, then $\sum_{k=1}^{3}(z_k - z_0)^2$ is equal to

a) 0 b) –i c) i d) 1

Ans: (a)

12. If the probability that the random variable X takes the value x is given by $P(X = x) = k(x + 1)3^{-x}, x = 0,1,2,3 \ldots$ where k is a constant then $P(x \geq 3)$ is equal to

a) $\frac{7}{27}$ b) $\frac{8}{27}$ c) $\frac{4}{9}$ d) $\frac{1}{9}$

Ans: (d)

13. Let the equation x(x + 2)(12 – k) = 2 have equal roots. Then the distance of the point $\left(k, \frac{k}{2}\right)$ from the line $3x + 4y + 5 = 0$ is

a) $15\sqrt{5}$ b) 15 c) $5\sqrt{3}$ d) 12

Ans: (b)

14. Let c be the circle of minimum area enclosing the ellipse $E: \frac{x^2}{a^2} + \frac{y^2}{b} = 1$ with eccentricity $\frac{1}{2}$ and foci $(\pm 2, 0)$. Let PQR be variable triangle, whose vertex P is on the circle c and the side QR of length $2a$ is parallel to the major axis of E and contains the point of intersection of E with the negative y-axis. Then the maximum area of the triangle PQR is

a) $6(2+\sqrt{3})$ b) $8(2+\sqrt{3})$ c) $6(3+\sqrt{2})$ d) $8(3+\sqrt{2})$

Ans: (b)

15. Let the mean and variance of five observations $x_1 = 1, x_2 = 3, x_3 = a, x_4 = 7$ and $x_5 = b, a > b$, be 5 and 10 respectively. Then the variance of the observations $n + x_n$, $n = 1,2,3,4,5$ is

a) 16.4 b) 17.4 c) 16 d) 17

Ans: (c)

16. Let $f: R \to R$ be a function defined by $f(x) = \big||x+2| - 2|x|\big|$. If m is the number of points of local minima and n is the number of points of local maxima of f, then m + n is

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

Ans: (a)