Sri Chaitanya ACADEMY

JEE Main – 07th April – 2025 (Shift-1)

[Memory Based Questions]

PHYSICS

1. In a resonance tube closed at one end. Resonance is obtained at length $l_1 = 120$ cm and $l_2 = 200$ cm. If $V_S = 340$ m/s. Find frequency of sound.

   a) 212.5Hz b) 218.4Hz c) 220.5Hz d) 202.5Hz

   Ans: (a)

2. 2 plane polarized light waves combine at certain point whose "E" components are

   $E_1 = E_0 \sin \omega t$.

   $E_2 = E_0 \sin (\omega t + \pi/3)$

   Find the Amplitude of Resultant wave.

   a) E_0 b) $0.9E_0$ c) $1.7E_0$ d) $3.4E_0$

   Ans: (c)

3. AC current is represented by $i = 5\sqrt{2} + 10\cos\left(650\pi t + \frac{\pi}{6}\right)$ Amp. The rms value of the current is

   a) $5\sqrt{2}$ Amp b) 50 Amp c) 50 Amp d) 10 Amp

   Ans: (d)

4. Dimension of $\left[\epsilon_0 \frac{d\phi E}{dt}\right]$ is?

   a) L^2A b) A c) A^{-1} d) $L^{-1}A$

   Ans: (b)

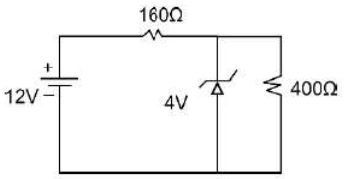
5. A lens having refractive index 1.6 has focal length of 12 cm, when it is in air. Find the focal length of the lens when it is placed in water is ____ (μ_w=1.28)

   a) 288 mm b) 655 mm

   c) 355 mm d) 555 mm

   Ans: (a)

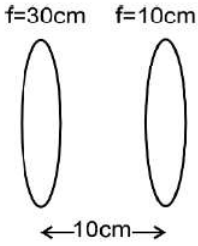
6. Find the current in Zener Diode



a) 50mA b) 30mA c) 10mA d) 40mA

Ans: (d)

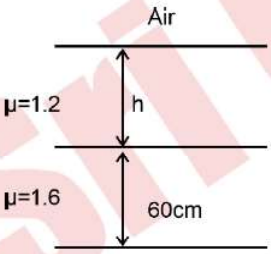
7. Find the power of combination?



a) 20D b) 5D c) 10D d) 15D

Ans: (c)

8. Find h if apparent depth is 40cm



a) 5cm b) 3cm c) 7cm d) 9cm

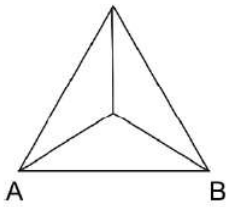
Ans: (b)

9. Two bodies projected with same initial velocities from same point with angles 45 + α and 45 – α. The ratio of their Time of Flights is

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

Ans: (b)

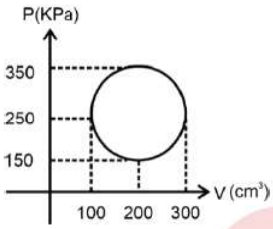
10. A wire of resistance R is made into a pyramid of a triangle. The equivalent resistance b/w $A\&B$ is $\frac{R}{n}$. Find ' n '.



a) 10 b) 14 c) 12 d) 16

Ans: (c)

11. Find the work done



a) 31.4J b) 21.8J c) 21.4J d) 11.4J

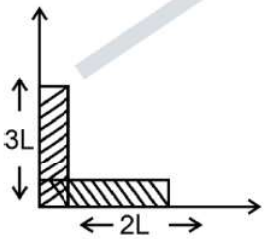
Ans: (a)

12. The percentage increase in magnetic field (B) when space within a current carrying solenoid is filled with magnesium (Given that susceptibility of magnesium is $1.2\text{x}10^{-5}$ at room temp)

a) $\frac{5}{6}\times 10^{-4}\%$ b) $\frac{5}{3}\times 10^{-5}\%$ c) $\frac{6}{5}\times 10^{-3}\%$ d) $\frac{5}{6}\times 10^{-5}\%$

Ans: (c)

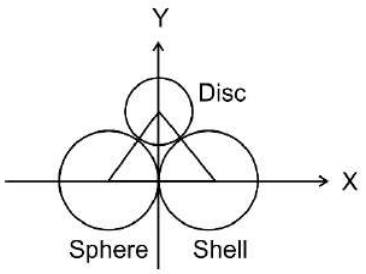
13 Where is position of center of mass of the system. ($L = 10$ cm)



a) $2i + 3j$ b) $4i + 9j$ c) $5i + 8j$ d) $3i + 7j$

Ans: (b)

14 Disc, Sphere and spherical shell of same mass and radius are placed as shown. Find moment of inertia about Y-axis



a) $\frac{199}{60}MR^2$ b) $\frac{189}{60}MR^2$ c) $\frac{179}{60}MR^2$ d) $\frac{159}{60}MR^2$

Ans: (a)

15 A composite sound wave is represented by $y = Acoswt + Acosw't$ the observe beat frequency is

a) $\frac{w-w'}{2\pi}$ b) $\frac{w'-w}{2\pi}$ c) $\frac{wt}{\pi}$ d) $\frac{w't}{\pi}$

Ans: (a)

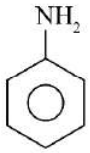
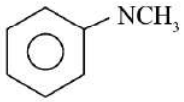
16 A cubic block of mass M is sliding down on inclined plane at 60° with an acceleration of g/2. The value of coefficient of kinetic friction is

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

Ans: (b)

CHEMISTRY

1. Which of the following gives positive Carbylamine test?

1) 2) 3) $(CH_3)_2-NH$ 4) CH_3NH_2 5) $(CH_3)_3-N$

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

Ans: (c)

2. Match the following List-I with List-II
(bp – bond pair and lp – lone pair)

List-I (Molecule)		List-II (bp & lp)	
A)	ICl_2^-	I)	4 : 2
B)	H_2O	II)	2 : 1
C)	SO_2	III)	2 : 3
D)	XeF_4	IV)	2 : 2

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

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

Ans: (b)

3. **Statement-1**: - Statement-l: D-(+)- Glucose and D-(+)- fructose are formed on hydrolysis of sucrose.

Statement-2: - Sucrose is called invert sugar.

Choose the **correct** option

a) Statement – 1 and Statement – 2 are correct

b) Statement – 1 and Statement – 2 are incorrect

c) Statement – 1 is correct and Statement – 2 is incorrect

d) Statement – 1 is incorrect and Statement – 2 is correct

Ans: (d)

4. A compound having molecular formula MX_3 has Van't Hoff factor of 2. What is the degree of dissociation?

a) 0.25 b) 0.5 c) 0.3 d) 0.75

Ans: (c)

5. Correct order of wavelength of the following colors:
(I) Red (II) Yellow
(III) Blue (IV) Violet

a) I > II > III > IV b) IV > III > II > I

c) IV > III > II > I d) II > I > III > IV

Ans: (a)

6. **Statement-1**: - Mohr's salt composed of only 3 types ions - ferrous, ammonium and sulfate.

Statement-2: - If molar conductance at infinite dilution of ferrous, ammonium, sulphate, ions are x_1, x_2, x_3 $Scm^2\ mol^{-1}$. Then molar conductance for Mohr's salt is $x_1 + x_2 + 2x_3$.

Choose the **correct** option

a) Statement – 1 and Statement – 2 are correct

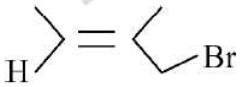
b) Statement – 1 and Statement – 2 are incorrect

c) Statement – 1 is correct and Statement – 2 is incorrect

d) Statement – 1 is incorrect and Statement – 2 is correct

Ans: (c)

7. Find the IUPAC name of the compound



a) 1-Bromo-4-methylbut-2-ene b) 1-Bromo-3-methylbut-2-ene

c) 1-Bromo-3-methylbut-3-ene d) 1-Bromo-2-methylbut-2-ene

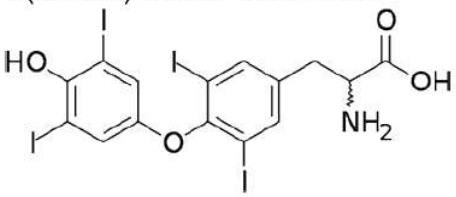
Ans: (d)

8. What is the number of valence electrons of the element that has the lowest enthalpy of atomization among the following: Cr, Fe, Co, and Ni?

a) 9 b) 8 c) 6 d) 10

Ans: (c)

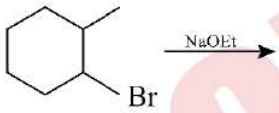
9. Given below is the structure of hormone "Thyroxine". What is the percentage of I (iodine) in the molecule?



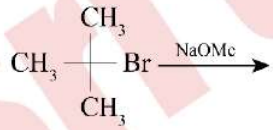
a) 65 b) 72 c) 85 d) 54

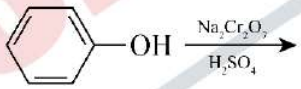
Ans: (a)

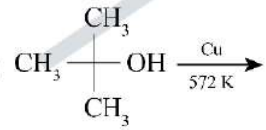
10. The reactions which can be applied to prepare an alkene by elimination are?

1) 

2) $CH_3 - CH_2 - CH(Br) - CH_3 \xrightarrow{KOH\ (aqs)}$

3) 

4) 

5) 

Choose the **correct** answers from the given above options.

a) 1, 3 and 5 only b) 1, 3 and 4 only

c) 2 and 4 only d) 2 and 5 only

Ans: (a)

11. An aqueous solution of HCl with pH 1.0 is diluted by adding equal volume of water (ignoring dissociation of water). The pH of HCl solution would _____ (Given log 2 = 0.30)

a) remain same
b) increase to 1.3
c) reduce to 0.5
d) increase to 2

Ans: (b)

12. In a Hydrogen like ion the energy difference between the excitation energy state and ground is 108.8 eV. The atomic number of the ion is

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

Ans: (d)

13. 1 mol of water at 10°C is converted into ice at −10°C. The change in enthalpy for complete conversion is _____
[Given : C_p of water $= x\,JK^{-1}\,mol^{-1}$ C_p of ice $= yJK^{-1}\,mol^{-1}$ $\Delta H_{fusion} = z\,J$]

a) $(-10x - 10y - z)J$
b) $(10x + 10y + z)J$
c) $(x + y - z)J$
d) $10(x + y - z)J$

Ans: (a)

14. Consider the following sequence of reaction:

$NH_4Cl + NaOH \longrightarrow X$ (gas)
X (gas) $+Y \longrightarrow$ Brown ppt.
Find out X (gas) and compound Y, respectively.

a) Cl_2 and K_2HgI_4
b) NH_3 and K_2HgI_4
c) NH_3 and KOH
d) HCl and HgI

Ans: (b)

15. Given below are two statements

Statement 1: Reductive ozonolysis of but-2-ene gives ethanal

Statement 2: Reductive ozonolysis of 3, 6-dimethly oct-4-ene doesn't give compound with chiral carbon.

In the light of the above two statements, choose the most appropriate option.

Choose the **correct** option

a) Statement – 1 and Statement – 2 are correct

b) Statement – 1 and Statement – 2 are incorrect

c) Statement – 1 is correct and Statement – 2 is incorrect

d) Statement – 1 is incorrect and Statement – 2 is correct

Ans: (c)

16. Given below are two statements.

Assertion (A): Sodium on reaction with alcohols liberates H_2 gas.

Reason (R): Alcohols are acidic in nature.

In the light of the above statements, choose the correct answer from the options given below:-

a) Both A and R are correct and R explains A.

b) Both A and R are correct but R does not explains A.

c) A is correct but R is incorrect.

d) A is incorrect but R is correct.

Ans: (a)

17. An octahedral complex having molecular composition $Co.5NH_3.Cl.SO_4$ has two isomers A & B. The solution of A gives a white precipitate with $BaCl_2$ solution, the type of isomerism exhibited by the complex is

a) Linkage isomerism b) Geometrical isomerism

c) Co-ordinate isomerism d) Ionization isomerism

Ans: (d)

18. Consider the following values of standard reduction potential, $E^{\circ}_{Cu^{2+}/Cu} = +0.34$ V and $E_{Ag^{+}/Ag} = +0.80$ V.

Find E_{cell} constituted by these two electrodes if, it contains $0.2MAg^{+}(aq)$ and $1.5MCu^{2+}(aq)$.

a) 0.50 Volts b) -0.50 Volts c) 0.41 Volts d) -0.41 Volts

Ans: (c)

19. Transition metal belonging to 3d series having lowest enthalpy of atomization in its most stable oxidation state forms oxide MO. Nature of oxide is

a) Highly acidic b) Amphoteric c) Highly basic d) Neutral

Ans: (b)

20. An organic compound weighing 500 mg produced 220 mg of CO_2, on complete combustion. The percentage composition of carbon in the compounds is ____ % (nearest integer) (Given molar mass is $g.mol^{-1}$ of (C – 12, O – 16))

Ans: 12%

MATHEMATICS

1. The number of relations on the set $A = \{1,2,3\}$ containing atmost 6 elements including (1, 2) which are reflexive and transitive but not symmetric is _____

   Ans: 12

2. The number of singular matrices of the order 2 whose elements are from the set $\{2,3,6,9\}$ is _____

   Ans: 36

3. The remainder when $((64)^{(64)})^{(64)}$ is divided by 7 is equal to

   a) 3 b) 4 c) 1 d) 6

   Ans: (c)

4. The integral $\int_0^{\pi} \frac{(x+3)\sin x}{1+3\cos^2 x}dx$ is equal to

   a) $\frac{\pi}{3\sqrt{3}}(\pi+6)$ b) $\frac{\pi}{2\sqrt{3}}(\pi+4)$ c) $\frac{\pi}{\sqrt{3}}(\pi+2)$ d) $\frac{\pi}{\sqrt{3}}(\pi+1)$

   Ans: (a)

5. If the area of the region bounded by the curves $y = 4 - \frac{x^2}{4}$ and $y = \frac{x-4}{2}$ is equal to α the 6α equals

   a) 240 b) 210 c) 250 d) 220

   Ans: (c)

6. Let x_1, x_2, x_3, x_4 be in a geometric progression. If 2,7,9,5 are subtracted respectively from x_1, x_2, x_3, x_4, then the resulting numbers are in an arithmetic progression. Then the value of $\frac{1}{24}(x_1.x_2.x_3.x_4)$ is _____

   a) 36 b) 72 c) 18 d) 216

   Ans: (d)

7. From a group of 7 batsmen and 6 bowlers, 10 players are to be chosen for a team, which should include at least 4 batsmen and at least 4 bowlers. One batsmen and one bowler who are captain and vice captain respectively of the team should be included. Then the total number of ways such a selection can be made is _____.

   a) 165 b) 145 c) 155 d) 135

   Ans: (c)

8. $\text{Lim}_{x\to 0^+} \frac{\tan\left[5(x)^{\frac{1}{3}}\right] \log_e[1+3x^2]}{(\tan^{-1} 3\sqrt{x})^2 [e^{5(x)^{4/3}}-1]}$ is equal to

a) $\frac{5}{3}$ b) 1 c) $\frac{1}{3}$ d) $\frac{1}{15}$

Ans: (c)

9. Let the set of all values of $p \in R$, for which both the roots of the equation $x^2 - (p+2)x + (2p+9) = 0$ are negative real numbers, be the interval $(\alpha, \beta]$, then $\beta - 2\alpha$ is equal to _____

a) 20 b) 0 c) 5 d) 9

Ans: (c)

10. Let A be 3×3 matrix such that $|\text{adj}(\text{adj}(\text{adj}A))| = 81$.

Let $S = \left\{n \in z: (|\text{adj}(\text{adj}A)|)^{\frac{(n-1)^2}{2}} = |A|^{(3n^2-5n-4)}\right\}$ then $\sum_{n\in S} \left|A^{(n^2+n)}\right|$ is equal to

a) 750 b) 820 c) 732 d) 866

Ans: (c)

11. Let 'P' be the parabola, whose focus is $(-2, 1)$ & directrix is $2x + y + 2 = 0$. Then the sum of the ordinates of the points on P, whose abscissa is –2 is _____

a) 5/2 b) 1/4 c) 3/4 d) 3/2

Ans: (d)

12. Let the angle θ, $0 < \theta < \pi/2$ between two unit vectors $\hat{a}$ and $\hat{b}$ be $\sin^{-1}\left[\frac{\sqrt{65}}{9}\right]$. If the vector $\vec{c} = 3\hat{a} + 6\hat{b} + 9(\hat{a} \times \hat{b})$, then the value of $9(\vec{c}.\hat{a}) - 3(\vec{c}.\hat{b})$ is _____

a) 24 b) 31 c) 29 d) 27

Ans: (c)

13. **Statement-I :** The set $\{z \in C - \{-i\}: |z| = 1$ and $\frac{z-i}{z+i}$ is purely real $\}$ contains exactly two elements and

Statement-II : The set $\{z \in C - \{-1\}: |z| = 1$ and $\frac{z-i}{z+i}$ is purely imaginary$\}$ contains if infinitely many elements. Then

a) only Statement – II is correct b) only Statement – I is correct

c) both are correct d) Both are incorrect

Ans: (a)

14. Let $x = -1$ & $x = 2$ be the critical points of the function $f(x) = x^3 + ax^2 + b\log_e|x| + 1$, $x \neq 0$. Let m and M respectively be the absolute minimum and the absolute maximum values of f in the interval $\left[-2, -\frac{1}{2}\right]$. Then $|M + m|$ is equal to _____ $(\log_e 2 = 0.7)$

a) 20.9 b) 19.8 c) 22.1 d) 21.1

Ans: (d)

15. Let the line L pass through (1,1,1) and intersect the lines $\frac{x-1}{2} = \frac{y+1}{3} = \frac{z-1}{4}$ and $\frac{x-3}{1} = \frac{y-4}{2} = \frac{z}{1}$. Then, which of the following points lies on the line L ?

a) (4,22,7) b) (5,4,3) c) $(10, -29, -50)$ d) (7,15,13)

Ans: (d)

16. The mean and standard deviation of 100 observations are 40 and 5.1 respectively. By mistake one observation is taken as 50 instead of 40. If the correct mean and the correct standard deviation are μ and σ respectively, then $10(\mu + \sigma)$ is equal to

a) 449 b) 451 c) 447 d) 445

Ans: (a)

17. Let C_1 be the circle in the 3rd quadrant of radius 3, that touches both coordinate axes. Let C_2 be the circle with center (1, 3) that touches C_1 externally at the point (α, β). If $(\beta - \alpha)^2 = \frac{m}{n}, \gcd(m, n) = 1$, then $m + n$ is equal to.

a) 31 b) 22 c) 13 d) 9

Ans: (b)

18. Let ABC be the triangle such that the equations of lines AB and AC be $3y - x = 2$ and $x + y = 2$ respectively and the points B and C lies on x-axis. If P is the orthocentre of $\triangle ABC$, then the area of triangle PBC is equal to

a) 10 b) 8 c) 4 d) 6

Ans: (d)

19. If the shortest distance between the lines $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ and $\frac{x}{1} = \frac{y}{2} = \frac{z-5}{1}$ is $\frac{5}{\sqrt{6}}$, then the sum of all possible values of 'α' is

a) 3/2 b) –3 c) 3 d) $-3/2$

Ans: (b)

20. Let the system of equations $2x+3y+5z=9$, $7x+3y-2z=8$, $12x+3y-(4+\lambda)z=16-\mu$, have infinitely many solutions. Then the radius of the circle centered at (λ,μ) and touching the line $4x=3y$ is

a) 21/5 b) 17/5 c) 7/5 d) 7

Ans: (c)

21. If for $\theta \in \left[-\frac{\pi}{3},0\right]$, the points $(x,y)=\left[3\tan\left(\theta+\frac{\pi}{3}\right),2\tan\left[\theta+\frac{\pi}{6}\right]\right]$ lie on the $xy+\alpha x+\beta y+\gamma=0$, then $\alpha^2+\beta^2+\gamma^2$ is equal to

a) 75 b) 72 c) 80 d) 96

Ans: (a)

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