

Sri Chaitanya

ACADEMY

JEE Main – 04th April – 2025 (Shift-2)

[Memory Based Questions]

PHYSICS

1. A block of mass 25 kg is pulled along a horizontal surface by a force at an angle 45° with the horizontal. The friction coefficient b/w the block and the surface is 0.25. The block travels at a uniform velocity, the work done by the applied force during a displacement of 5m of block is

a) 735 J b) 490 J c) 245 J d) 970 J

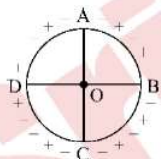
Ans: (c)

2. Displacement of a wave is expressed as $x(t) = 5\cos\left(628t + \frac{\pi}{2}\right)$ m. the wavelength of wave when its Velocity is 300 m/s is.

a) 0.5m b) 5m c) 0.33m d) 3m

Ans: (d)

3. A metallic ring is uniformly charged as shown in fig. AC & BD are two mutually perpendicular diameters. Electric field due to arc AB at 'O' is E in magnitude. What would be the magnitude of Electric field at 'O' due to arc ABC?



a) $\sqrt{2}E$ b) Zero c) $E/2$ d) $2E$

Ans: (a)

4. The ratio of electric dipole moment to magnetic dipole moment is $M^P L^Q T^R A^S$ then P + Q ?

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

Ans: (a)

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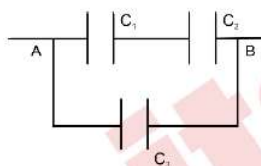
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5. A wheel is rolling on a plane surface the speed of a particle on the highest point of the rim is 8 m/s, the speed of the particle on the rim of the wheel at the same level as the centre of the wheel is

a) $\sqrt{2}$ b) $3\sqrt{2}$ c) $4\sqrt{4}$ d) $4\sqrt{2}$

Ans: (d)

6. Three parallel plate capacitors C_1 , C_2 , C_3 , each of capacitances $5\mu\text{F}$ are connected as the effective capacitance between points A & B, when the space between the parallel plates of C_1 capacitor is filled with a dielectric medium having dielectric constant of 4 is



a) 9 b) 10 c) 3 d) 7

Ans: (a)

7. An object is kept at rest at a distance of $3R$ above the earth's surface where R is the earth's radius. The minimum speed with which it must be projected so that it does not return to earth is

a) $\sqrt{GM/2R}$ b) $\sqrt{GM/4R}$ c) $\sqrt{GM/R}$ d) $\sqrt{GM/3R}$

Ans: (a)

8. There are 'n' number of identical electrical bulb, each in designed to draw a power 'P' supply. The total power drawn by the series combination is

a) $\frac{P}{n^2}$ b) P c) nP d) P/n

Ans: (d)

9. In YDSE slits are separated by 1.5 mm & $D = 2\text{m}$, $\lambda = 400 \text{ nm}$. It is observed that 20 maximas of double slit lie inside the central maxima of single slit diffraction. The width of each slit is

a) 0.18mm b) 0.1mm c) 0.15mm d) 0.2mm

Ans: (c)

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10. A finite size object is placed uniformly normal to the principle axis at a distance of 30 cm from a convex mirror of focal length 30 cm. A plane mirror is now parallel placed such a way that the image produced by both the mirror coincide with each other. The distance between the mirror is

a) 6.5cm b) 7.5cm c) 5.5cm d) 4.5cm

Ans: (b)

11. Two polarisers P_1 and P_2 are placed in such a way that the intensity of the transmitted light will be zero. A third polariser P_3 is inserted between P_1 and P_2 at a particular angle between P_2 and P_3 . The transmitted intensity of the light passes through the polarisers is maximum. The angle between P_2 and P_3 is

a) $\pi/4$ b) $\pi/2$ c) π d) $\pi/3$

Ans: (a)

12. Match List – I with List – II

List-I		List-II	
i)	Isobaric	a)	$\Delta Q = \Delta W$
ii)	Isochoric	b)	$\Delta Q = \Delta U$
iii)	adiabatic	c)	$\Delta Q = 0$
iv)	isothermal	d)	$\Delta Q = \Delta U + P\Delta V$

a) i- d, ii- b, iii- c, iv- a

b) i- a, ii- d, iii- c, iv- b

c) i- c, ii- b, iii- d, iv- a

d) i- b, ii- d, iii- c, iv- a

Ans: (a)

13. Consider a rectangular sheet of solid material $l = 9$ cm and $d = 4$ cm. The coefficient of linear expansion is $\alpha = 3.1 \times 10^{-5} \text{ K}^{-1}$ at room temperature and one atmosphere. The mass of sheet $m = 0.1$ kg and the specific heat capacity $C_v = 900 \text{ J kg}^{-1} \text{ K}^{-1}$. If the amount of heat supplied to the material is $8.1 \times 10^2 \text{ J}$. The change in area of the sheet is

a) 0.04 cm^2 b) 0.08 cm^2 c) 0.09 cm^2 d) 0.02 cm^2

Ans: (d)

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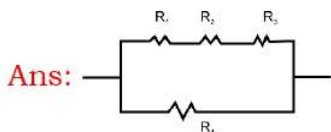
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14. $R_1 = R_2 = R_3 = 5\Omega$ & $R_4 = 10\Omega$ which of the following combination is the best circuit to get an equivalent resistance of 6Ω



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CHEMISTRY

1. Maximum IE and minimum IE of group 13 elements
 a) B, In b) B, TI c) Al, In d) Al, TI

Ans: (a)

2. **Statement-1**:- Alcohol is prepared from alkyl halide in presence of aq.KOH by elimination

Statement-2:- Alkenes are prepared from alkyl halide with alc. KOH by β - elimination

Choose the **correct** option

- a) Statement – 1 and Statement – 2 are correct
 b) Statement – 1 and Statement – 2 are incorrect
 c) Statement – 1 is true and Statement – 2 is false
 d) Statement – 1 is false and Statement – 2 is true

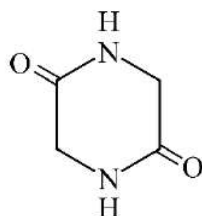
Ans: (d)

3. Total number of electrons in chromium ($Z = 24$) for which the value of azimuthal quantum number $l = 1$ and $l = 2$

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

Ans: c

4. A dipeptide 'x' on complete hydrolysis gives 'y' and 'z' on treatment with aq. HNO_2 produces lactic acid on the other hand 'z' on heating gives the following molecule. Based on the information the given dipeptide is



- a) Alanine-Glycine b) Valine-Glycine
 c) Valine-Leucine d) Alanine-Alanine

Ans: (a)

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5. The amount of Calcium Oxide produced when 150kg of Limestone (75% pure) on strong heating is:

a) 64kg b) 63kg c) 65kg d) 62kg

Ans: (b)

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

List-I		List-II	
A)	Isobaric	I)	$\Delta q = \Delta w$
B)	Isochoric	II)	$\Delta q = \Delta U$
C)	Adiabatic	III)	$\Delta q = \text{zero}$
D)	Isothermal	IV)	$\Delta q = \Delta U + P\Delta V$

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

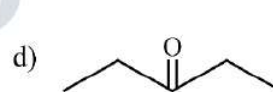
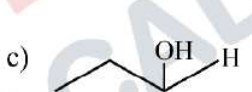
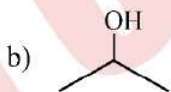
b) A-II, B-III, C-I, D-IV

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

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

Ans: (c)

7. Which of the following gives yellow PPT with $I_2/NaOH$?



a) both a and b

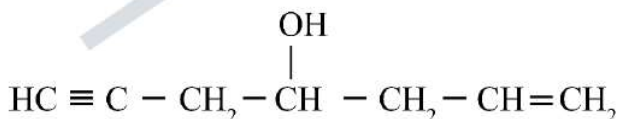
b) both a and c

c) both a and d

d) None

Ans: (a)

8. The IUPAC name of the following compound is



a) 4-Hydroxy hept-6-en-1-yne

b) Hept-6-en-1-yne-4-ol

c) 4-Hydroxy hept-1-en-6-yne

d) Hept-1-en-6-yne-4-ol

Ans: (d)

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9. Consider the following complex ions



Which of the following order is correct for their unpaired electrons?

a) $c > d > a = b$

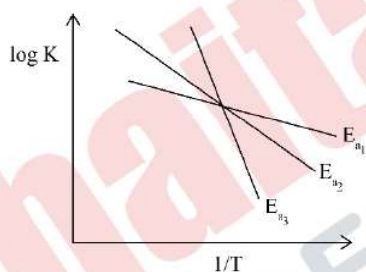
b) $c > d > a > b$

c) $a > b > c > d$

d) $c > a > d > b$

Ans: (a)

10. Consider the following graph between Rate Constant (K) and $\frac{1}{T}$.



a) $E_{a1} > E_{a2} > E_{a3}$

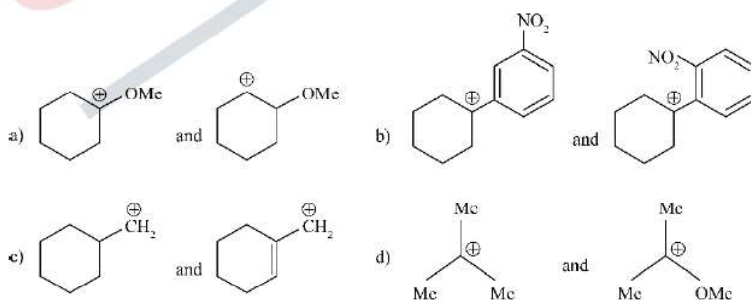
b) $E_{a3} > E_{a2} > E_{a1}$

c) $E_{a3} > E_{a1} > E_{a2}$

d) $E_{a1} > E_{a3} > E_{a2}$

Ans: (b)

11. In which of the following first carbocation more stable than second



a) a and c

b) a and d

c) a and b

d) b and d

Ans: (c)

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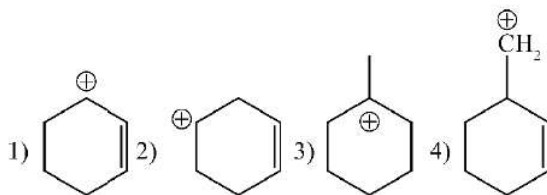
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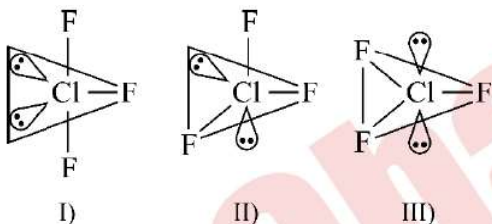
12. Arrange the following carbocation in decreasing order of their stability



- a) (1) > (2) > (3) > (4) b) (1) > (3) > (2) > (4)
c) (4) > (1) > (2) > (3) d) (2) > (3) > (1) > (4)

Ans: (b)

13. **Statement-1**:- ClF_3 has 3 possible structures



Statement-2:- Structure III is most stable structure due to least lone pair-bond pair repulsion.

Choose the **correct** option

- a) Statement – 1 and Statement – 2 are correct
b) Statement – 1 and Statement – 2 are incorrect
c) Statement – 1 is true and Statement – 2 is false
d) Statement – 1 is false and Statement – 2 is true

Ans: (c)

14. The **incorrect** relationship in the following pair in relation to ionization enthalpies is

- a) $\text{Mn}^+ < \text{Mn}^{+2}$ b) $\text{Mn}^{+2} < \text{Fe}^{+2}$
c) $\text{Fe}^{+2} < \text{Fe}^{+3}$ d) $\text{Mn}^+ < \text{Cr}^+$

Ans: (b)

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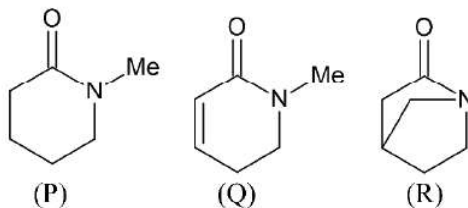
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15. The correct order of the basicity for the following molecules is



- a) $R > P > Q$ b) $R > Q > P$ c) $Q > P > R$ d) $P > Q > R$

Ans: (b)

16. If x mg of $Mg(OH)_2$ is added in 1 L of solution to make a solution with $pH = 10$, then find the value of x.

[Given: MW of $Mg(OH)_2 = 58$ g/mol]

Assume $Mg(OH)_2$ dissociates completely in water.

Ans: 2.9

17. Consider the following zero order reaction:
 $A \rightarrow \text{Products}$

Half-life of the reaction is 1 hr if initial concentration of the reactant is 2 mol/L. Find the half-life of the reaction in minutes if the initial concentration of the reaction is 0.5 mol/L.

Ans: 15

18. An octahedral complex ion of metal (M^{4+}) with ligand NH_3 and Cl^- gives 'n' mol of precipitate with 1 mol of complex ion with $AgNO_3$ solution. The value of n is same as number of lone pair present in central atom of BrF_3 . Find the total number of isomers of complex ion.

Ans: 2

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MATHEMATICS

1. $\sum_{k=1}^n \left(\alpha^k + \frac{1}{\alpha^k}\right)^2 = 20$, α is one of the root of $x^2 + x + 1 = 0$ then $n = ?$

Ans: 20

2. If $\int \frac{(\sqrt{1+x^2}+x)^{10}}{(\sqrt{1+x^2}-x)^9} dx = \frac{1}{2} \left[\frac{1}{m} (\sqrt{1+x^2}+x)^m + \frac{1}{n} (\sqrt{1+x^2}-x)^n \right] + c$, where c is the constant of integration and $m, n \in \mathbb{N}$ then $m + n$ is _____

Ans: 38

3. Let the mean & variance of observation 2,3,3,4,5,7, a, b is 4 and 2, then mean deviation about mode of the observation is

Ans: 1

4. If the sum of first 20 terms of series $\frac{4.1}{4+3.1^2+1^4} + \frac{4.2}{4+3.2^2+2^4} + \frac{4.3}{4+3.3^2+3^4} + \frac{4.4^5}{4+4.4^2+4^4} + \dots$ is $\frac{m}{n}$, where m, n are co-primes, then $m + n$ is equal to

a) 422 b) 423 c) 420 d) 421

Ans: (d)

5. Let the three sides of a triangle ABC is given by vectors $2\hat{i} - \hat{j} + \hat{k}$, $\hat{i} - 3\hat{i} - 5\hat{k}$ & $3\hat{i} - 4\hat{j} - 4\hat{k}$, let G be the centroid of triangle ABC. Then $6(|\vec{AG}|^2 + |\vec{BG}|^2 + |\vec{CG}|^2)$ is

a) 140 b) 144 c) 146 d) 148

Ans: (b)

6. Consider two sets A & B containing three numbers in A.P. Let the sum and the product of the elements of A be 36 and p respectively and the sum and the product of B be 36 and q respectively. Let d & D be the common difference of AP's in A & B respectively such that

$D = d + 3$, $d > 0$. If $\frac{p+q}{p-q} = \frac{19}{5}$ then $p - q = ?$

Ans: 45

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7. Let the matrix $A = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix}$ satisfy $A^n = A^{n-2} + A^2 - I$ for $n \geq 3$ then the sum of all the elements of A^{50} is _____

Ans: 53

8. Let the values of P for which shortest distance between the lines $\frac{x+1}{3} = \frac{y}{4} = \frac{z}{5}$ & $\vec{r} = (p\hat{i} + 2\hat{j} + \hat{k}) + \lambda(2\hat{i} + 3\hat{j} + 4\hat{k})$ is $\frac{1}{\sqrt{6}}$ be $a, b (a < b)$ then the length of the latus rectum of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is _____

Ans: 2/3

9. Let the sum of the focal distance of the point $P(4, 3)$ on the hyperbola $H: \frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ be $8\sqrt{\frac{5}{3}}$. If for H , the length of the Latus rectum is _____

Ans: $2\sqrt{10}/3$

10. Let $f(x) - 2f\left(\frac{1}{x}\right) = x^2 + 5$, $2g(x) - 3g\left(\frac{1}{x}\right) = x$, $x > 0$. If $\alpha = \int_1^2 f(x)dx$, and $\beta = \int_1^2 g(x)dx$ then the value of $9\alpha + \beta = ?$

Ans: -55

11. $1^2({}^{15}C_1) + 2^2({}^{15}C_2) + 3^2({}^{15}C_3) + \dots + 15^2({}^{15}C_{15}) = 2^m \cdot 3^n \cdot 5^k$ then $m + n + k = ?$

Ans: 19

12. A line passing through the point $A(-2, 0)$ touches the parabola $P: y^2 = x - 2$ at the point B in the first quadrant. The area of the region bounded by the line AB , Parabola P and the x -axis is _____

Ans: 8/3

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