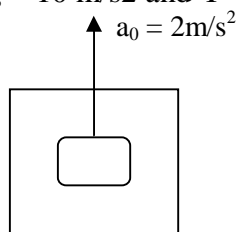


Sample Paper (For XIIth Non-Medical Entrance)

Physics :

- A stone tied to the end of a string of 1 m long is whirled in a horizontal circle with a constant speed. If the stone makes 22 revolution in 44 seconds, what is the magnitude and direction of acceleration of the stone?
(a) $\pi^2/4 \text{ ms}^{-2}$ and direction along the radius
(b) $\pi^2 \text{ ms}^{-2}$ and direction along the tangent to the circle
(c) $\pi^2 \text{ ms}^{-2}$ and direction along the radius towards the centre
(d) $\pi^2 \text{ ms}^{-2}$ and direction along the radius away from the centre
- A force produces an acceleration of 4 m/s^2 in body of mass $m_1 \text{ kg}$ and the same force produce an acceleration of 6 m/s^2 in another body of mass $m_2 \text{ kg}$. If the same force is applied to $(m_1 + m_2)$, then the acceleration (in m/s^2) will be:
(a) 10 (b) 2 (c) 2.4 (d) 5.4
- A particle moves in the x-y plane under the action of a force \vec{F} such that the value of its linear momentum \vec{P} at any time t is ; $P_x = 2 \cos t$, $P_y = 2 \sin t$
The angle θ between \vec{F} and \vec{P} at a given time t will be
(a) 90° (b) 0° (c) 180° (d) 30°
- A particle of mass $m = 5$ is moving with a uniform speed $v = 3\sqrt{2}$ in the XOY plane along the line $y = x + 4$. The magnitude of the angular momentum of the projectile about the origin is
(a) 60 units (b) $40\sqrt{2}$ units (c) zero (d) 7.5 units.
- A person brings a mass of 1 kg from infinity to a point A. Initially the mass was at rest but it moves at a speed of 2m/s as it reaches A. The work done by the person on the mass is -3J . The potential at A is:
(a) -3J/kg (b) -2J/kg (c) -5J/kg (d) None of these
- One end of a steel wire is fixed to ceiling of an elevator moving up with an acceleration 2 m/s^2 and a load of 10 kg hangs from other end. Area of cross-section of the wire is 2 cm^2 . The longitudinal strain in the wire is: (Take $g = 10 \text{ m/s}^2$ and $Y = 2 \times 10^{11} \text{ N/m}^2$)

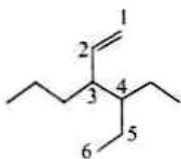


- (a) 4×10^{11} (b) 3×10^{-6} (c) 8×10^{-6} (d) 2×10^{-6}
- A simple harmonic progressive wave is represented by the equation $y = 8 \sin 2\pi(0.1x - 2t)$ where x and y are in cm and t is in seconds. At any instant the Phase difference between two particles separated by 2.0 cm in the x -direction is
(a) 18° (b) 36° (c) 54° (d) 72°

Chemistry :

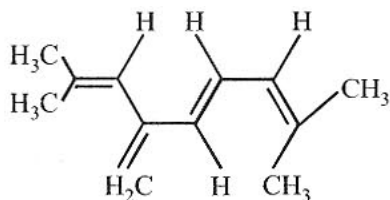
- The energy absorbed by each molecule (A_2) of a substance is $4.4 \times 10^{-19} \text{ J}$ and bond energy per molecule is $4.0 \times 10^{-19} \text{ J}$. The kinetic energy of the molecule per atom will be
(a) $2.0 \times 10^{-20} \text{ J}$ (b) $2.2 \times 10^{-19} \text{ J}$ (c) $2.0 \times 10^{-19} \text{ J}$ (d) $4.0 \times 10^{-20} \text{ J}$
- Among the following series of transition metals ions, the one where all metal ions have $3d^2$ electronic configuration is:
(a) Ti^{3+} , V^{2+} , Cr^{3+} , Mn^{4+} (b) Ti^+ , V^{4+} , Cr^{6+} , Mn^{7+}
(c) Ti^{4+} , V^{3+} , Cr^{2+} , Mn^{3+} (d) Ti^{2+} , V^{3+} , Cr^{4+} , Mn^{5+}
- Which of the following species contains three bond pairs and one lone pair around the central atom?
(a) NH_2^- (b) PCl_3 (c) H_2O (d) BF_3

4. The molar heat capacity of water at constant pressure P, is $75 \text{ JK}^{-1} \text{ mol}^{-1}$. When 1.0 kJ of heat is supplied to 100 g of water which is free to expand, the increase in temperature of water is:
 (a) 1.2 K (b) 2.4 K (c) 4.8 K (d) 6.6 K
5. Aluminium is extracted from alumina (Al_2O_3) by electrolysis of a molten mixture of:
 (a) $\text{Al}_2\text{O}_3 + \text{Na}_3\text{AlF}_6 + \text{CaF}_2$ (b) $\text{Al}_2\text{O}_3 + \text{KF} + \text{Na}_3\text{AlF}_6$
 (c) $\text{Al}_2\text{O}_3 + \text{HF} + \text{NaAlF}_4$ (d) $\text{Al}_2\text{O}_3 + \text{CaF}_2 + \text{NaAlF}_4$
6. The correct IUPAC name of the compound,



is:

- (a) 3-(1-ethyl propyl) hex-1-ene (b) 4-Ethyl-3-propyl hex-1-ene
 (c) 3-Ethyl-4-ethenyl heptane (d) 3-Ethyl-4-propyl hex -5-ene
7. The total number of π -bond electrons in the following structure is :-



- (a) 8 (b) 12 (c) 16 (d) 4

Mathematics :

1. The points $z_1 = 0$, $z_2 = a - i$ and $z_3 = 1 - bi$ ($a, b \in \mathbb{R}$) form an equilateral triangle then
 (a) $a = b = 2 + \sqrt{3}$ (b) $a = -b$ (c) $a = b = 2 - 2\sqrt{3}$ (d) None of these
2. The curve $y = (\lambda + 1)x^2 + 2$ intersects the curve $y = \lambda x + 3$ is exactly one point, if λ equals
 (a) $\{-2, 2\}$ (b) $\{1\}$ (c) $\{-2\}$ (d) $\{2\}$
3. Eight chairs are numbered 1 to 8. Two women and three men wish to occupy one chair each. First the women choose the chairs from amongst the chairs marked 1 to 4 ; and then the men select the chairs from amongst the remaining. The number of possible arrangements is
 (a) ${}^6\text{C}_3 \times {}^4\text{C}_2$ (b) ${}^4\text{P}_2 \times {}^4\text{P}_3$ (c) ${}^4\text{C}_2 + {}^4\text{P}_3$ (d) ${}^4\text{P}_2 \times {}^6\text{P}_3$
4. If sum of the coefficients of the first, second and third terms of the expansion of $\left(x^2 + \frac{1}{x}\right)^m$ is 46, then the coefficient of the term that does not contain x is
 (a) 84 (b) 92 (c) 98 (d) 106
5. The least value of x for $0 < x < \pi/2$, such that $\cos(2x) = \sqrt{3} \sin(2x)$, is
 (a) $\frac{\pi}{12}$ (b) $\frac{2\pi}{12}$ (c) $\frac{3\pi}{12}$ (d) $\frac{4\pi}{12}$
6. In a triangle ABC if $\tan A = \frac{1}{2}$, $\tan B = k + \frac{1}{2}$ and $\tan C = 2k + \frac{1}{2}$ then the possible values of k
 (a) $13/2$ (b) $11/4$ (c) $11/5$ (d) $15/4$
7. Angle between tangents drawn to $x^2 + y^2 - 2x - 4y + 1 = 0$ at the points where it is cut by the line $y = 2x + c$, is $\frac{\pi}{2}$ then
 (a) $|c| = \sqrt{5}$ (b) $|c| = 2\sqrt{5}$ (c) $|c| = \sqrt{10}$ (d) $|c| = 2\sqrt{10}$

Answers Key

Physics

1	2	3	4	5	6	7
(b)	(c)	(a)	(a)	(c)	(b)	(d)

Chemistry

1	2	3	4	5	6	7
(a)	(d)	(b)	(b)	(a)	(b)	(a)

Mathematics

1	2	3	4	5	6	7
(a)	(a)	(d)	(a)	(a)	(b)	(c)