Questions on Oscillation, Paper 2

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- 1. The kinetic energy of a particle executing S.H.M. is 16 J when it is at its mean position. If the mass of the particle is 0.32 kg, then what is the maximum velocity of the particle? (MHT-CET-2004)
 - (a) 5 m/s (b) 15 m/s (c) 10 m/s (d) 20 m/s
- 2. If a hole is bored along the diameter of the earth and a stone is dropped into the hole (CPMT 84)
 - (a) The stone reaches the centre of the earth and stops there
 - (b) The stone reaches the other side of the earth and stops there
 - (c) The stone executes simple harmonic motion about the centre of the earth
 - (d) The stone reaches the other side of the earth and escapes into space
- A simple pendulum of length L and mass m is oscillating in a plane about a vertical line between angular limits -φ and+φ. For an angular displacement

 $\theta(|\dot{\theta}|<\phi)$ The tension in the string and the velocity of the bob are T and υ respectively. The following relation holds good under the above conditions (IIT 86)

- (a) $T \cos\theta = mg$
- (b) $T m g \cos \theta = \frac{mv^2}{L}$
- (c) $T = mg \cos \theta$
- (d) Tangential acceleration $|a_T| = g \sin \theta$
- 4. When a particle performing uniform circular motion of radius 10 cm undergoes the SHM, what will be its amplitude? (MHT-CET-2004)
 (a) 10 cm
 (b) 5 cm

(a)		(U)	JUII
(c)	2.5 cm	(d)	20 cm

5. The work done by the tension in the string of a pendulum during one complete vibration is equal to

(NCERT 83)

- (a) Potential energy of pendulum
- (b) Total energy of pendulum
- (c) Kinetic energy of pendulum
- (d) Zero
- 6. A particle is executing simple harmonic motion with an amplitude a. when its kinetic energy is equal to its potential energy its distance from the mean position

(CPMT 90, PMT MP 87)

(a) $\frac{a}{2}$ (b) $\frac{a}{\sqrt{2}}$

(c)
$$\frac{a}{\sqrt{3}}$$
 (d) $\frac{a}{\sqrt{3}}$

7. A magnet of magnetic M oscillates in magnetic field B with time period 2 sec. If now the magnet is cut into two half pieces parallel to the axis, then what is new time period if only one part oscillate in field? (MHT-CET-2004)

(a)	2 s	(b)	2√2 s
(c)	$\frac{1}{\sqrt{2}}$ s	(d)	2.4 s

8. Time period of simple pendulum of length I and a place where acceleration due to gravity is g is T. what is the period of a simple pendulum of the same length at a place where the acceleration due to gravity is 1.029 is,

(CPMT 82)

(a)	Т	(b)	1.02 T
(c)	0.99 T	(d)	1.01 T

 The potential energy of a particle with displacement X is U (X). the motion is simple harmonic, when
 (CDMT 22)

(K is a positive constant) (CPMT 82)

(a)
$$U = \frac{KX^2}{2}$$
 (b) $U = KX^2$
(c) $U = K$ (d) $U = KX$

10. A particle is subjected to two S.H.M.s $x_1 = A_1 \sin \omega t$ and $x_2 = A_2 \sin \left(\omega t + \frac{\pi}{4} \right)$. The resultant S.H.M.

will have an amplitude of (IIT 96)

(a)
$$\frac{A_1 + A_2}{2}$$

(b) $\sqrt{A_1^2 + A_2^2}$
(c) $\sqrt{A_1^2 + A_2^2 + \sqrt{2} A_1 A_2}$
(d) $A_1 + A_2$

 11. If velocity of a body is half the maximum velocity. Then what is the distance from the mean position? (MHT CET 2002, 2003)

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

- 12. If the length of the simple pendulum is increased by 44%, then what is the change in time period of pendulum? **(MHT-CET-2004)**
 - (a) 22% (b) 20% (c) 33% (d) 44%

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- A linear harmonic oscillator of force constant 2 \times 13. 10⁶ N/m and amplitude 0.01 m has a total mechanical energy of 100 J. it's maximum potential energy is
 - (IIT 89)
 - (a) 100 J (b) 200 J 150 J (d) (c) 0
- The period of oscillation of a simple pendulum of 14. constant length at earths surface is T, it period inside a mine is (CPMT 73)
 - (a) Greater than T.
 - (b) Less than T.
 - (c) Equal to T.
 - (d) Cannot be compared
- A spring having a spring constant k is loaded with 15. a mass m. the spring is cut into two equal parts and one of these is loaded again with the same mass. The new spring constant is (NCERT 90)
 - (a) (b) k 2 k² (c) 2k (d)
- Dimensions of force constant are (MHT CET 16. 2003)
 - (a) $[M^1 L^0 T^{-2}]$ (b) $[M^{-1} L^0 T^{-2}]$ $[M^1 L^1 T^{-2}]$ $[M^{-1} L^1 T^{-2}]$ (c) (d)
- 17. Spring is pulled down by 2 cm. What is amplitude of motion? (MHT-CET-2003)
 - (a) 0 cm (b) 6 cm
 - (d) (c) 2 cm 4 cm
- The particle is performing S.H.M. along a straight 18. line with amplitude 'a', the potential energy is maximum when the displacement is (CPMT 82)

(a)	А	(b)	<u>a</u> 2
(c)	0	(d)	<u>a</u> 4

- The period of a simple pendulum is doubled when 19. (CPMT 74)
 - (a) Its length is doubled
 - (b) The mass of the bob is doubled
 - Its length is made four times (c)
 - The mass of the bob and the length of the (d) pendulum are doubled.
- Particle moves from extreme position to mean 20. position, its (MHT-CET-2003)
 - (a) Kinetic energy increases, potential increases decreases
 - (b) Kinetic energy decreases, potential increases
 - Both remains constant (c)
 - Potential energy becomes zero and kinetic (d) energy remains constant

- 21. If a particle is moving in a circle, with a uniform speed, then its motion is, (CPMT 78) (b) Periodic
 - (a) Oscillatory
 - (c) Non-periodic (d) Simple harmonic
- 22. A simple pendulum performs simple harmonic motion about x = 0 with an amplitude A and time

period T. the speed of the pendulum at $x = \frac{A}{2}$ will

- be (PMT-MP 87)
- $\pi A \sqrt{3}$ (a) (b) т πА√З (d) (c)
- 23. If velocity of body is half the maximum velocity. Then what is the distance from the mean position? (MHT-CET-2003)
 - (b) $\frac{\sqrt{3}}{2} \times A$ 2 A (a) (d) (c) Α
- 24. The necessary and sufficient condition for S.H.M.

(NCERT 74)

is

- (a) Constant period
- (b) Constant acceleration
- Proportionality between restoring force and (c) displacement from equilibrium position in opposite direction
- (d) None of the above
- 25. The motion of a particle executing simple harmonic motion is given by $X = 0.01 \sin 100\pi$ (t + 0.05), where X is in metres ant t in second. The time period in second is (CPMT 90)
 - (a) 0.001 0.02 (b)
 - (c) 0.1 0.2 (d)

Answers to Oscillation, Paper 2

1. Answer: (c)

- 2. Answer: (c) 3. Answer: (b)
- 4. Answer: (a)
- 5. Answer: (d)
- 6. Answer: (b)
- 7. Answer: (a)
- 8. Answer: (c)
- 9. Answer: (b)
- 10. Answer: (c)
- 11. Answer: (b)
- 12. Answer: (b)
- 13. Answer: (a)
- 14. Answer: (a)
- 15. Answer: (c)
- 16. Answer: (a)
- 17. Answer: (c)
- 18. Answer: (a)
- 19. Answer: (c)
- 20. Answer: (a)
- 21. Answer: (b)
- 22. Answer: (c)
- 23. Answer: (b)
- 24. Answer: (c)
- 25. Answer: (b)