Physicsaholics

DPP – 2 (SHM)

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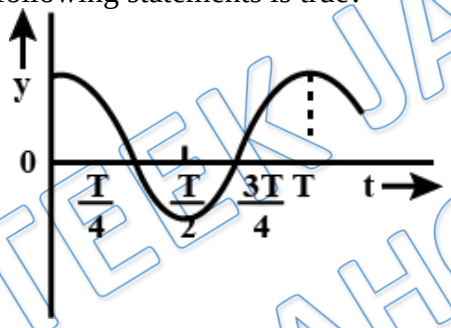
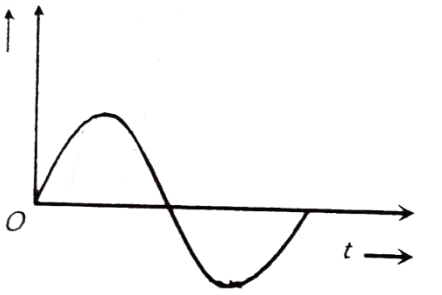
Q 1. In S.H.M. which one of the following graphs is a straight line ?
(a) P.E. against displacement
(b) acceleration against time
(c) total energy against displacement
(d) velocity against displacement

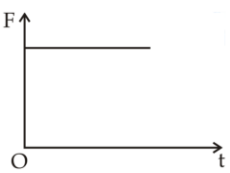
Q 2. The displacement time graph of a particle executing S.H.M. (in straight line) is shown. Which of the following statements is true?

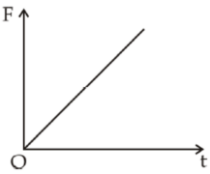


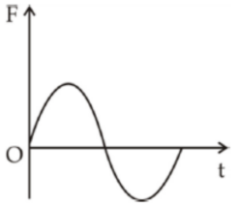
(a) the velocity is maximum at t = T/2
(b) the acceleration is zero at t = T
(c) the force is maximum at t = 3T/4
(d) the potential energy equals the total oscillation energy at t = T/2

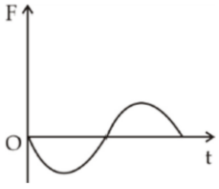
Q 3. The displacement time graph of a particle executing S.H.M. is as shown in the figure. The corresponding force-time graph of the particle is



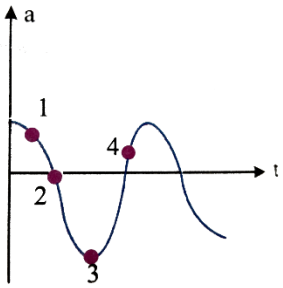
(a) 

(b) 

(c) 

(d) 

Q 4. Acceleration-time graph of a particle executing SHM is as shown in figure. Select the correct alternatives(s)



(a) Displacement of particle at 1 is positive
(b) Velocity of particle at 2 is negative
(c) Potential energy of particle at 3 is minimum
(d) Speed of particle at 4 is decreasing

Q 5. What is the ratio between the potential energy and the total energy of a particle executing SHM, when its displacement is half of its amplitude?
(a) 1 : 1 (b) 1 : 2
(c) 1 : 3 (d) 1 : 4

Q 6. A particle is executing SHM with an amplitude 4 cm. the displacement at which its energy is half kinetic and half potential is
(a) 1 cm (b) $\sqrt{2}$ cm
(c) 2 cm (d) $2\sqrt{2}$ cm

Q 7. A particle performing SHM with amplitude 10cm. At What distance from mean position the kinetic energy of the particle is thrice of its potential energy ?
(a) 5 cm (b) 3 cm
(c) 7 cm (d) 1 cm

Q 8. A particle executes SHM with an amplitude of 10 cm and frequency 2 Hz. At $t = 0$, the particle is at a point where potential energy and kinetic energy are same. The equation for its displacement is
(a) x = 0.1 sin $\left(4\pi t + \frac{\pi}{4}\right)$m (b) x = 0.1 sin$(4\pi t)$m
(c) x = 0.1 sin $\left(4\pi t + \frac{\pi}{3}\right)$m (d) x = 0.1 sin $\left(4\pi t - \frac{\pi}{3}\right)$m

Q 9. A particle starts SHM at time t=0. Its amplitude is A and angular frequency is ω. At time t=0 its kinetic energy is $\frac{E}{4}$. Assuming potential energy to be zero at mean position, the displacement-time equation of the the particle cannot be written as (E = total mechanical energy of oscillation).

(a) $x = A\cos\left(\omega t + \frac{\pi}{6}\right)$ (b) $x = A\sin\left(\omega t + \frac{\pi}{3}\right)$

(c) $x = A\sin\left(\omega t - \frac{2\pi}{3}\right)$ (d) $x = A\cos\left(\omega t - \frac{\pi}{4}\right)$

Q 10. A particle starts Simple harmonic motion from the mean position. Its amplitude is a and total energy E. At on instant its kinetic energy is $\frac{3E}{4}$. Its displacement at that instant is

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

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

Q 11. The total energy of a vibrating particle in SHM is E. If its amplitude and time period are doubled, its total energy will be :-

(a) 16E (b) 8E

(c) 4E (d) E

Q 12. The amplitude of a particle executing SHM is made three-fourth keeping its time period constant. Its total energy will be

(a) $\frac{E}{2}$ (b) $\frac{3E}{4}$

(c) $\frac{9E}{16}$ (d) none of these

Q 13. A particle starts its SHM from mean position at t = 0. If its time period is T and amplitude A then the distance travelled by the particle in the time from $t = 0 \rightarrow t = \frac{5T}{4}$ is

(a) A (b) 3A

(c) 4A (d) 5A

Q 14. In simple harmonic motion of a particle, maximum kinetic energy is 40 J and maximum potential energy is 60 J. then

(a) minimum potential energy will be 30 J

(b) potential energy at half the displacement will be 30 J

(c) kinetic energy at half the displacement is 40 J

(d) potential energy or kinetic energy at some intermediate position cannot be found the given data

Answer Key

Q.1 c	**Q.2 d**	**Q.3 d**	**Q.4 d**	**Q.5 d**
Q.6 d	**Q.7 a**	**Q.8 a**	**Q.9 d**	**Q.10 b**
Q.11 d	**Q.12 c**	**Q.13 d**	**Q.14 b**	