

1- The displacement of an object attached to a spring and executing simple harmonic motion is given by $x = 2 \times 10^{-2} \cos(\pi t/4)$ (in m). The time at which the maximum speed first occurs is?

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

2- A particle is executing simple harmonic motion at midpoint of mean position and extremely. What is the potential energy in terms of total energy (E)?

- a) $E/4$
- b) $E/16$
- c) $E/2$
- d) $E/8$

3- If a simple pendulum oscillates with amplitude of 50mm and time period of 5s, then its maximum velocity is?

- a) 0.06m/s
- b) 0.16m/s
- c) 0.26m/s
- d) 0.32m/s

4- If the period of oscillation of mass m suspended from a spring is 4s, then the period of mass $8m$ will be _____

- a) 0.71s
- b) 4s
- c) 8s
- d) 11.3 s

5- If a particle is oscillating on the same horizontal plane in the ground _____

- a) It has only kinetic energy but no potential energy
- b) It has only potential energy but no kinetic energy
- c) It has both kinetic and potential energies
- d) It has neither kinetic nor potential energies

6- A spring 40mm long is stretched by the acceleration of a force. If 50N force is required to stretch the spring through 4mm, then work done in stretching through 30mm is?

- a) 84J
- b) 48J
- c) 5.6J
- d) 8J

7- In a simple harmonic oscillator, at the mean position

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- a) Kinetic energy is minimum, potential energy is maximum
 - b) Both kinetic and potential energies are maximum
 - c) Kinetic energy is maximum, potential energy is minimum
 - d) Both kinetic and potential energies are minimum

8- What is the maximum acceleration of the particle executing the simple harmonic motion, $y = 4\sin[(2\pi t/4)+\phi]$, where y is in cm?

- a) $\pi/2 \text{ cm/s}^2$
- b) $\pi^2/2 \text{ cm/s}^2$
- c) $\pi/4 \text{ cm/s}^2$
- d) $\pi^2 \text{ cm/s}^2$

9- A particle executing simple harmonic motion of amplitude 8mm has a maximum acceleration of 37 mm/s^2 . The frequency of its oscillation is?

- a) 0.24Hz
- b) 0.34Hz
- c) 0.5Hz
- d) 2.2Hz

10- Kepler's third law is known as

- a. The Law of orbits
- b. The Law of Areas
- c. The Law of periods
- d. The Law of gravity

11- Kepler's laws of planetary motion replaced circular orbits with

- a) elliptical orbits
- b) parabolic orbits
- c) conical orbits
- d) hyperbolic orbits

12- What does Kepler's second law state?

- a. The sun is at one of the foci of all the planets' eccentric orbits around the sun.
- b. The radius vector traced from the sun to the planet sweeps out the same amount of area in the same amount of time.
- c. The cube of a planet's semi-major axis is precisely proportional to the square of its time period of revolution around the sun in an elliptical orbit.
- d. All of the mentioned.

13- For a simple pendulum the time period of one oscillation is given by

- a. $2\pi\sqrt{g/l}$
- b. $2\pi\sqrt{2l/g}$
- c. $2\sqrt{l/2g}$
- e. $2\pi\sqrt{l/g}$

14- Kepler's 2nd law deals with

- a. The shape of the planet's orbits
- b. The speed/area the planet travels
- c. The length of time it takes the planet to orbit the sun
- d. Time travel

15- In order to double the period of a simple pendulum, the length of the string should be

- a. halved
- b. doubled
- c. quadrupled
- d. zero

16- The energy stored in the spring of a watch is:

- a) K.E
- b) Electrical Energy
- c) Elastic P.E
- d) Solar Energy

17- A simple pendulum is 50.0 cm long. What will be its frequency of vibration at the place where $g=9.8\text{ms}^{-2}$?

- a. 0.50 Hz
- b. 0.60 Hz
- c. 0.70 Hz
- d. 0.80 Hz

19- The unit of Poisson's ratio is

- a. Newton
- b. Joule
- c. N/m
- d. No unit

20- The dimension of angular acceleration is:

- a. T^{-1}
- b. T^{-2}
- c. T^{-3}
- e. LT^{-2}

21- The dimension of linear velocity is:

- a. T^{-1}
- b. T^{-2}
- c. LT^{-2}
- d. LT^{-1}

22- In SHM, the velocity of the particle is maximum at:

- a. equilibrium position
- b. Extreme position
- c. In between mean and extreme position
- d. None

23- The S.I units of spring constant are:

- a. m
- b. m^{-1}
- c. Nm^{-1}
- d. Nm^{-2}

24- Which expression is correct for the time period of a simple pendulum:

- a. $T \propto L$
- b. $T \propto m$
- c. $T \propto \sqrt{m}$
- d. $T \propto \sqrt{L}$

An object vibrating at the end of a spring, if the equation from its position, as a function of time is $x=45\text{cm} \cos (\pi t)$.

25- The amplitude of an object vibrating at the end of a spring is

- a. 0.15 m

b. 0.25 m

c. 0.35 m

d. 0.45 m

26- Its frequency is

a. 0.05 Hz

b. 0.5 Hz

c. 2 Hz

d. 4 Hz

27- What is the displacement of the object after 2.0 s?

a. 0.15 m

b. 0.25 m

c. 0.35 m

d. 0.45 m

28- A car of mass 1300 kg is constructed using a frame supported by four springs. Each spring has a spring constant 20000 Nm^{-1} . If two people are riding in the car have a combined mass of 200 kg, find the time period of vibration of the car, when it is driven over a pot hole in the road. Assume the weight is evenly distributed.

- a. 0.41 s
- b. 0.86 s
- c. 1.18 s
- d. 1.77 s

A load of 15.0 kg elongates a spring by 5.0 m. If body of mass 300 kg is attached to the spring and is set into vibration with an amplitude of 10.0 cm, what will be the

29- Period

- a. 20.07 s
- b. 30 s
- c. 40.26 s
- d. 50.38 s

30- Spring Constant

- a. 15.5 Nm^{-1}
- b. 29.4 Nm^{-1}
- c. 50.94 Nm^{-1}
- d. 100 Nm^{-1}

31- Maximum speed of its vibration.

- a. 0.02 m/s
- b. 0.03 m/s
- c. 0.04 m/s
- d. 0.05 m/s

32- Maximum acceleration of its vibration

- a. 0.0031 m/s^2
- b. 0.0041 m/s^2
- c. 0.0071 m/s^2
- d. 0.0098 m/s^2

33- $M^0 L^0 T^{-1}$ refers to quantity

- a) Gradient velocity
- b) frequency
- c) both a and b
- d) Force

34- The dimensional formula for Kinetic energy is

- a- $M^0 L^{-2} T^{-2}$
- b- $M^0 L^2 T^{-2}$
- c- $M^1 L^2 T^{-2}$
- d- $M^1 L^3 T^{-2}$

35- Which of the following is a derived quantity:

- a- Work
- b- Mass
- c- Length
- d- Time

36- The dimensional formula for Planck's constant when $E = h\nu$ is

- a- MLT
- b- ML^2T^{-1}
- c- $M^2L^2T^{-1}$
- d- $ML^{-1}T^{-1}$

37- Dimensions of kinetic energy is the same as that of _____

- a- Acceleration
- b- Velocity
- c- Work
- d- Force

38- The quantity having the same unit in all system of unit is

- a- mass
- b- time
- c- length
- d- temperature

39- Which of the following pairs of physical quantities have the same unit?

- a- Force and power
- b- Stress and Young's modulus
- c- Young's modulus and pressure
- d- Both b and c

40- Which of these equations could possibly be correct according to a dimensional check? Where (V) represent velocity, (a) is the acceleration, (X) is the displacement and (t) is the time.

- a) $X = V t + 2 a t^2$
- b) $X = V t^2 + 2 a t$
- c) $X = V t + \frac{1}{2} a t$
- d) $X = V t^2 + \frac{1}{2} a t^2$

41- For the equation $F \propto A^x v^y d^z$, where F is the force, A is the area, v is the velocity and d is the density, the values of x, y and z are respectively

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

42- What is the dimensional formula for Gravitational constant?

- a- $ML^2 T^{-3}$
- b- $ML^{-1} T^{-2}$
- c- $ML^{-1} T^{-1}$
- d- $M^{-1} L^3 T^{-2}$

43- For the equation the time period of a simple pendulum $T \propto l^a m^b \theta^c g^d$ where, length of the pendulum L , mass of the bob m , angle which the thread makes with vertical θ and acceleration due to gravity (g). the values of a, b, c and d are respectively

- a. 0.5, -0.5, 0, -1
- b. 0.5, 0, 0, -0.5
- c. -0.5, 0, 0, 0.5
- d. 1, 0.5, 0, 0

44- In SHM, the maximum velocity of particle is 0.16 m/s and its maximum acceleration is 0.64 m/s^2 . The amplitude is

- a. 0.04 cm
- b. 4 m
- c. 0.04 m
- d. 40 m

45- In SHM of a simple pendulum, component of weight which is directed towards mean position is

- a) $mg \cos\theta$
- b) $mg \sin\theta$
- c) 0
- d) $mg \tan\theta$

46- The dimensional formula for the weight is

- a. $M^0 L^{-2} T^{-2}$
- b. $M L T^{-2}$
- c. $M^0 L^0 T^0$
- d. $M^1 L^3 T^{-2}$

47- For the equation $a \propto A^x v^y$, where a is the acceleration, A is the area and v is the velocity, the values of x and y are respectively

- a. - 0.5, 2
- b. 2, 0.5
- c. 2, -0.5
- d. -2, -0.5

48- Poisson's ratio is

- a. Transverse strain / Longitudinal strain
- b. Shear strain / Lateral strain
- c. Longitudinal strain / Lateral strain
- d. Lateral strain / Volumetric strain

49- When the angle of contact between a solid and a liquid is lower than 90° , then

- (a) Cohesive force > Adhesive force
- (b) Cohesive force < Adhesive force
- (c) Cohesive force = Adhesive force
- (d) Cohesive force $\gg$ Adhesive force

50- Adhesive forces are the forces acting_____

- a) Between molecules of different materials
- b) Between molecules of same material
- c) Between water and glass capillary tube
- d) Due to gravity

51- The surface of pure water in contact with glass wall is

- a) Plane
- b) concave
- c) convex
- d) Both 'b' and 'c'

52- A liquid does not wet the surface of a solid if the angle of contact is

- a) Zero
- b) An acute one
- c) 45°
- d) An obtuse one

53- The unit of surface tension coefficient in the MKS system is

- a) N/m
- b) Kg/cm
- c) Dyne/cm
- d) Dyne/m

54- If the dimensions of a physical quantity are given by $[L^a M^b T^c]$, then the physical quantity will be

- a) force, if $a = -1, b = 0, c = -2$
- b) pressure, if $a = -1, b = 1, c = -2$
- c) velocity, if $a = 1, b = 0, c = 1$
- d) acceleration, if $a = 1, b = 1, c = -2$

55- Which of the following represents correct dimensions of the coefficient of viscosity?

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

56- On increasing the temperature, the viscosity of the fluid

- a) Decreases
- b) Increases
- c) Remains constant
- d) None of the mentioned

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- c) Remains constant
- d) None of the mentioned

57- The frictional force of two adjacent layers of a fluid is inversely proportional to the

- a) Area of contact of two adjacent layers
- b) Velocity difference between two adjacent layers
- c) Distance between two adjacent layers
- d) None of the mentioned

58- The resistance of fluid to flow is due to the _____ between layers of fluid.

- a) gravitational force
- b) velocity gradient
- c) Frictional force
- d) None of the above

59- The Frictional force between two fluid layers is inversely proportional to the

- a) area of the layers
- b) perpendicular distance between layers
- c) different velocity between layers
- d) viscosity coefficient of fluid

61- What is the unit of coefficient of viscosity?

- a) kg.s.m^{-2}
- b) kg.m.s^{-2}
- c) N.m.s^{-2}
- d) N.s.m^{-2}

62- Suppose a sphere of radius 'r' is dropped into a viscous liquid of coefficient of viscosity ' η ' and its velocity at an instant is ' v '. What is the frictional force according to Stoke's law?

a) $F = 6 \pi r \eta v$

b) $F = 6 \pi r^2 \eta v$

c) $F = 4 \pi r \eta v$

d) $F = 2 \pi r \eta v$

63- The coefficient of viscosity (η) by using Stoke's Law is given by:

a) $\eta = \frac{1}{9} g (\rho_s - \rho_L) \frac{r^2}{v}$

b) $\eta = \frac{9}{2} g (\rho_s - \rho_L) \frac{r^2}{v}$

c) $\eta = \frac{2}{9} g (\rho_s - \rho_L) \frac{r^2}{v}$

d) $\eta = \frac{2}{9} g (\rho_s - \rho_L) \frac{v}{r^2}$

64- The factor on which viscosity depends is

a) Area of contact of two adjacent layers

b) Velocity difference between two adjacent layers

c) The distance between two adjacent layers

d) All of the mentioned

65- The surface tension for pure water in a capillary tube experiment is

a) $\frac{3g}{2hr}$

b) $\frac{3}{hr\rho g}$

c) $\frac{r\rho g}{2h}$

d) $\frac{hr\rho g}{\gamma}$