Physics

Reg.No. : ☐☐☐☐☐☐

Exam Time : 03:00:00 Hrs

Total Marks : 70

15 x 1 = 15

1) A student tunes his guitar by striking a 120 Hertz with a tuning fork, and simultaneously plays the 4th string on his guitar. By keen observation, he hears the amplitude of the combined sound oscillating thrice per second. Which of the following frequencies is the most likely the frequency of the 4th string on his guitar?.

   (a) 130   (b) 117   (c) 110   (d) 120

2) In hot summer aft er a bath, the body's

   (a) internal energy decreases   (b) internal energy increases   (c) heat decreases   (d) no change in internal energy and heat

3) The center of mass of a system of particles does not depend upon,

   (a) position of particles   (b) relative distance between particles   (c) masses of particles   (d) force acting on particle

4) A uniform force of $(2\hat{i}+\hat{j})$ N acts on a particle of mass 1 kg. The particle displaces from position $(3\hat{j}+\hat{k})$ m to $(5\hat{i}+3\hat{j})$ m. The work done by the force on the particle is

   (a) 9 J   (b) 6 J   (c) 10 J   (d) 12 J

5) The angle subtended by a coin of radius 1 em held at a distance of 80 em from your eyes is

   (a) 1.43^0 (b) 0.72^0 (c) 0.0125^0 (d) 0.025^0

6) According to Newton, the viscous force acting between liquid layers of area A and velocity gradient $\triangle v/\triangle z$ is given by $F = -\eta A\frac{\triangle v}{\triangle z}$, where h is constant called coefficient of viscosity. The dimensional formula of h is

   (a) $[ML^{-2}T^{-2}]$ (b) $[M^0L^0T^0]$ (c) $[ML^2T^{-2}]$ (d) $[ML^{-1}T^{-1}]$

7) One of the combinations from the fundamental physical constants is $\frac{hc}{G}$, The unit of this expression is

   (a) Kg^2 (b) m^3 (c) S^{-1} (d) m

8) In a simple harmonic oscillation, the acceleration against displacement for one complete oscillation will be

   (a) an ellipse   (b) a circle   (c) a parabola   (d) a straight line

9) When a car takes a sudden left turn in the curved road, passengers are pushed towards the right due to

   (a) inertia of direction   (b) inertia of motion   (c) inertia of rest   (d) absence of inertia

10) The force acting on a body is measured as 4.25 N. Round it off with two significant figure_____.

   (a) 4.3   (b) 4.2   (c) both (a) or (b)   (d) 4.25

11) The linear momentum and position vector of the planet is perpendicular to each other at

   (a) perihelion and aphelion   (b) at all points   (c) only at perihelion   (d) no point

12) The number of significant figures in 0.06900 is _____

   (a) 2   (b) 2   (c) 4   (d) 5

13) The word scientia is meaning to _____.

   (a) exact   (b) to know   (c) control   (d) implement

14) The horizontal range of a projectile fired at an angle of 15° is 50 m. If it is fired with the same speed at angle of 45°, its range will be

   (a) 125 m   (b) 75 m   (c) 100 m   (d) 150 m

15) Consider two wires X and Y. Th e radius of wire X is 3 times the radius of Y. If they are stretched by the same load then the stress on Y is

   (a) equal to that on X   (b) thrice that on X   (c) nine times that on X   (d) Half that on X

6 x 2 = 12

16) The momentum of a system of particles is always conserved. True or false?

17) A body of mass 100 kg is moving with an acceleration of 50 cm s^{-2}. Calculate the force experienced by it.

18) A bullet of mass 20 g strikes a pendulum of mass 5 kg. Th e centre of mass of pendulum rises a vertical distance of 10 em. If the bullet gets embedded into the pendulum, calculate its initial speed

19) Define a vector. Give examples.

20) The radius of the circle is 3.12 m. Calculate the area of the circle with regard to significant figures.

21) A variable force $F = kx^2$ acts on a particle which is initially at rest. Calculate the work done by the force during the displacement of the particle from $x = 0$ m to $x = 4$ m. (Assume the constant $k = 1 N m^{-2}$)

$$6 \times 3 = 18$$

22) A cyclist while negotiating a circular path with speed 20 m s^{-1} is found to bend an angle by 30° with vertical. What is the radius of the circular path? (given, $g = 10$m s^{-2})

23) What is the difference between sliding and slipping?

24) Compute the work done by the gravitational force for the following cases
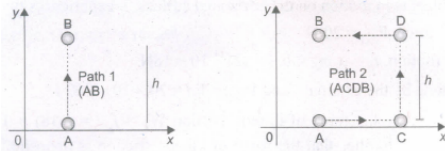
25) Define torque and mention its unit.

26) Write the rules for determining significant figures.

27) State Newton's second law.

$$6 \times 5 = 30$$

28) What do you mean by propagation of errors? Explain the propagation of errors in addition and multiplication.

29) A three storey building of height 100m is located on Earth and a similar building is also located on Moon. If two people jump from the top of these buildings on Earth and Moon simultaneously, when will they reach the ground and at what speed? ($g = 10$m s^{-2})

30) Calculate the centripetal acceleration of Moon towards the Earth.

31) A swimmer moves across the Cauvery river of 750 m wide. The velocity of the swimmer relative to water ($\vec{v}_{sw}$) is 1.5 ms^{-1} and directed perpendicular to the water current. The velocity of water relative to the bank ($\vec{v}$wb) is 1 ms^{-1}. Calculate the
(a) velocity of the swimmer with respect to the bank of the river ($\vec{v}_{sb}$).
(b) time taken by the swimmer to cross the Cauvery river.

32) Consider a circular leveled road of radius 10m having coefficient of static friction 0.81. Three cars (A, B and C) are travelling with speed 7 ms^{-1}, 8m s^{-1} and 10 ms^{-1} respectively. Which car will skid when it moves in the circular level road? ($g = 10$ m s^{-2}).

33) A gun weighing 25 kg fires a bullet weighing 30 g with the speed of 200 ms^{-1}. What is the speed of recoil of the gun.