Physics (Circular Motion, Oscillations Waves)
TEST NO 7

Q.1 Energy is not carried by
A) Longitudinal progressive waves
B) Transverse progressive waves
C) Electromagnetic waves
D) Stationary waves

Q.2 For an observer standing on a railway platform; the pitch of the whistle of a receding locomotive heard will be
A) First lower and then higher than the actual pitch
B) First higher and then lower than the actual pitch
C) Higher than the actual pitch
D) Lower than the actual pitch

Q.3 In which case increase in wavelength causes an apparent decrease in the frequency of sound waves for the listener
A) When listener is moving towards stationary sound source
B) When listener is moving away from stationary sound source
C) When sound source is moving towards stationary listener
D) When sound source is moving away from stationary listener

Q.4 In stationary wave the distance between two successive nodes or two successive antinodes is equal to
A) λ
B) $\dfrac{\lambda}{3}$
C) $\dfrac{\lambda}{2}$
D) $\dfrac{\lambda}{4}$

Q.5 If a train is approaching a station at 72 kmh^{-1} sounding a whistle of frequency 1000 Hz, then in one second; for a listener sitting on the platform the waves are compressed by an amount. (Speed of sound = 340 ms^{-1})
A) 32 cm
B) 0.32 cm
C) 0.02 cm
D) 2.0 cm

Q.6 A tube closed at one end and containing air, produces, when excited, the fundamental note of frequency 512 Hz. If the tube is open at both ends. The fundamental frequency that can be excited is (in Hz)
A) 1024
B) 256
C) 512
D) 128

Q.7 A simple pendulum performs simple harmonic motion about X = 0 with an amplitude A and time period T. The speed of the pendulum at $X = \dfrac{A}{2}$ will be:
A) $\dfrac{\pi A\sqrt{3}}{T}$
B) $\dfrac{\pi A}{T}$
C) $\dfrac{\pi A\sqrt{3}}{2T}$
D) $\dfrac{3\pi^2 A}{T}$

Q.8 A body is executing simple harmonic motion with an angular frequency 2rad/s. the velocity of the body at 20 mm displacement, when the amplitude of motion is 60 mm, is
A) 40 mm/s
B) 60 mm/s
C) 113 mm/s
D) 120 mm/s

Q.9 A simple harmonic oscillator has a period of 0.01 sec and an amplitude of 0.2 m. the magnitude of the velocity in m sec^{-1} at the centre of oscillation is:
A) 20π
B) 100
C) 40π
D) 100π

Q.10 The distance between two points on a periodic wave is 0.2 m. Find the phase difference between these two points, if the wavelength of the wave is 1.2 m
A) $\dfrac{\pi}{2}$
B) $\dfrac{\pi}{3}$
C) $\dfrac{\pi}{6}$
D) $\dfrac{\pi}{2}$

Q.11 The apparent frequency of the whistle of an engine changes in the ratio of 6 : 5 as the engine passes a stationary observer. If the velocity of sound is 330 ms^{-1}, then the velocity of the engine is
A) 20 m s^{-1}
B) 30 m s^{-1}
C) 33 m s^{-1}
D) 22 m s^{-1}

Q.12 Select wrong statement from the following. Electromagnetic waves
A) Are transverse
B) Travel with same speed in all media
C) Travel with the speed of light
D) Are produced by accelerating charges

Q.13 A body is moving in a circular path with a constant speed. It has
A) A constant velocity
B) A constant acceleration
C) An acceleration of constant magnitude
D) An acceleration which varies with time

Q.14 A car moves on a circular road. It describes equal angles about the centre in equal intervals of time. Which of the following statement about the velocity of the car is true?
A) Magnitude of velocity is not constant
B) Both magnitude and direction of velocity change
C) Velocity is directed towards the centre of the circle
D) Magnitude of velocity is constant but direction changes

Q.15 A body of mass 5 kg is moving in a circle of radius 1m with an angular velocity of 2 radian / sec. The centripetal force is
A) 10 N
B) 20 N
C) 30 N
D) 40 N

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Q.16 Two particle s are executing S.H.M. the equation of their motion are
$y_1 = 10 sin\left(\omega t + \frac{\pi T}{4}\right) . y_2 = 25\, sin\left(\frac{\sqrt{3}\pi T}{4}\right)$. what is the ratio of their amplitudes?
A) 1 : 1   B) 1 : 2   C) 2 : 5   D) None of these

Q.17 A body is whirled in a horizontal circle of radius 20 cm. It has angular velocity of 10 radius. What is its linear velocity at any point on circular path
A) 10 m/s   B) 2 m/s   C) 20 m/s   D) $\sqrt{2}\ m/s$

Q.18 In uniform circular motion, the velocity vector and acceleration vector are:
A) Perpendicular to each other   C) Opposite direction
B) Same direction   D) Not related to each other

Q.19 The periodic time of a body executing simple harmonic motion is 3 sec. after how much interval from time $t = 0$, its displacement will be half of its amplitude
A) $\frac{1}{8}$ sec   B) $\frac{1}{4}$ sec   C) $\frac{1}{6}$ sec   D) $\frac{1}{3}$ sec

Q.20 A system exhibiting S.H.M. must possess:
A) intertia only   C) Elasticity, intertia and an external force
B) Elasticity as well as inertia   D) Elasticity only

Q.21 An object is moving in a circle of radius 100 m with a constant speed of 31.4 m/s. What is its average speed for one complete revolution.
A) Zero   B) 31.4 m/s   C) 3.14 m/s   D) $\sqrt{2} \times 31.4\ m/s$

Q.22 A body moves with constant angular velocity on a circle. Magnitude of angular acceleration
A) variable   B) Constant   C) Zero   D) None of above

Q.23 Cream gets separated out of milk when it is churned, it is due to
A) Gravitational force   B) Centripetal force   C) Centrifugal force   D) Frictional force

Q.24 A particle of mass m is executing uniform circular motion on a path of radius r. if p is the magnitude of its linear momentum. The radial force acting on the particle is

A) pmr B) $\dfrac{rm}{p}$ C) $\dfrac{mp^2}{r}$ D) $\dfrac{p^2}{rm}$

Q.25 A particle moves with constant angular velocity in a circle. During the motion its
A) Energy is conserved
B) Momentum is conserved
C) Energy and momentum both are conserved
D)None of the above is concerned

Q.26 The angular velocity of a particle rotating in a circular orbit 100 times per minute is
A) 1.66 rad s^{-1} B) 10.47 rad s^{-1} C) 10.47 deg s^{-1} D) 60 deg s^{-1}

Q.27 A stone of mass 16 kg is attached to a string 144 m long and is whirled in a horizontal circle. The maximum tension the string can stand is 16 N. the maximum velocity of revolution that can be given to the stone without breaking the string is:
A) 20ms   B) 16ms   C) 14ms   D) 12ms

Q.28 A satellite is revolving around the earth in a circular orbit with a uniform speed v. if the gravitational force suddenly disappears, the satellite will:
A) Continue to move in the same orbit with speed v
B) Move tangentially to the orbit with speed v
C) Move away from the earth normally to the orbit
D) Fall down on the earth

Q.29 Two satellites A and B go round a planet P in circular orbits having radii 4r and r respectively. If the speed of A is 3v, that of B will be
A) 12 v   B) 6 v   C) (4/3) v   D) (3/2) v

Q.30 A body of mass m moves in a circular path with uniform angular velocity. The motion of the body has constant.
A) Acceleration   B) Velocity   C) Momentum   D) Kinetic energy

Q.31 Two identical springs of force constant 'k' are connected in a) series b) in parallel. The combinations support mass 'm' at lower end. The ratio of the period of oscillations mass 'm' in series and parallel combination is
A) 1:1   B) 1:2   C) 1:4   D) 2:1

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Q.32 When the potential energy of a particle executing simple harmonic motion is one-fourth of its maximum value during the oscillation, its displacement from equilibrium in terms of its amplitude 'a' is

A) a/4   B) a/3   C) a/2   D) 2a/3

Q.33 The time period of second pendulum on the surface of moon is:

A) 1 s   B) 2 s   C) 3 s   D) 4 s

Q.34 Two springs A and B such that $\dfrac{k_A}{k_B} = 2$ are stretched by the same suspended weight. Then ratio of extension produced in A to that of B is

A) 1 : 2   B) 2 : 1   C) 1 : 4   D) 4 : 1

Q.35 The angular speed of an engine wheel making 90 revolutions per minute is

A) 1.5 π rad/s   B) 3 π rad/s   C) 4.5 π rad/s   D) 6 π rad/s

Q.36 The angular velocity of second's hand in a watch is

A) 0.82 rad/sec   B) 0.105 rad/sec   C) 0.21 rad/sec   D) 0.052 rad/sec

Q.37 Two particles of equal mass revolving in circular paths of radii r_1 and r_2 respectively with the same angular velocity. The ratio of their centripetal force will be

A) r_1 / r_2 B) r_2 / r_1 C) $(r_2 / r_1)\,1/2$ D) $(r_2 / r_1)\,2$

Q.38 If a train of waves moving along a rope has a velocity of 100ms^{-1} and a wavelength of 20m, then the time period is:

A) 5 seconds   B) 2000 seconds   C) 0.2 second   D) 666 second

Q.39 A wave of frequency 1000Hz travels between X and Y. a distance of 600m in 2s. How many wavelengths are there in XY?

A) 300   B) 180   C) 3.3   D) 2000

Q.40 The particles which are in phase in the diagram are

A)   A, E   B)   C, F   C)   B, D   D)   A, B