NEET PHYSICS 2018-19 - Chennai

Periodic Test : 04 **Test ID : 016**

Number of questions: 150 **Test date: 23.03.2019**

Name: _____ **Time**: 3HRS

ID No: _____

Negative Marks : 4 marks for correct attempt & 1 mark deducted for every wrong attempt.

1. A particle starts its motion from rest under the action of a constant force. If the distance covered in first 10 seconds is S_1 and that covered in the first 20 seconds is S_2, then
   (a) $S_2 = 3S_1$
   (b) $S_2 = 4S_1$
   (c) $S_2 = S1$
   (d) S, = 2S

2. A bus is moving with a speed of 10 ms^{-1} on a straight road. A scooterist wishes to overtake the bus in 100 s. If the bus is at a distance of 1 km from the scooterist, with what speed should the scooterist chase the bus
   (a) 40 m s^{-1}
   (b) 25 m s^{-1}
   (c) 10 m s^{-1}
   (d) 20 m s^{-1}

3. A particle moves in a straight line with a constant acceleration. It changes its velocity from 10 ms^{-1} to 20ms^{-1} while passing through a distance 135 m in t second. The value of t is
   (a) 12
   (b) 9
   (c) 10
   (d) 1.8

4. The distance travelled by a particle starting from rest and moving with an acceleration
   4/3 ms^{-1}, in the third second is
   (a) 10/3 m
   (b) 19/3 m
   (c) 6m
   (d) 4m

5. A particle moving along x-axis has acceleration f, at time given by $f = f_0(1 - t/T)$, where$f$o and T are constants. The particle at t = 0 has zero velocity. In the time interval between t = 0 and the instant when f = 0, the particle's velocity (v_x) is
   (a) 1/2 f_0T^2
   (b) f_0T^2
   (c)1/2 f_0T
   (d) f_0T^2

6. The horizontal range and the maximum height of a projectile are equal. The angle of projection is
   (a) $\theta = \tan^{-1}(\frac{1}{4})$
   (b) $\theta=\tan^{-1}(4)$
   (c) $\theta=\tan^{-1}(2)$
   (d) $\theta= 45°$

7. A particle has initial velocity (21 +37) and acceleration (0.31 +0.27), The magnitude of velocity after
   (a) 9,sh
   (b) uni

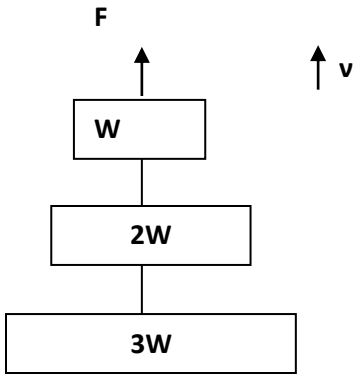
(c) 5 units -seconds will be 410
(d)) 5-sh units (d) 9 units

8. A particle move. in a circle of radius 5 cm with constant speed and time period 0.2n s. The acceleration of the particle is
   (a) 15 m/s2
   (b) 25 m/s2
   (c) 36 m/s2
   (d) 5 m/s2

9. A missile is fired for maximum range with an initial velocity of 20 m/s. If g = 10 m/s2, the range of the missile is
   (a) 40m
   (b) 50m
   (c) 60m
   (d) 20 m

10. A body is moving with velocity 30 m/s towards east. After 10 seconds its velocity becomes 40 m/s towards north. The average acceleration of the body is
    (a) 1 m/s^2
    (b) 7 m/s^2
    (c) $\sqrt{7}$ m/s^2
    (d) 5 m/s^2

11. Three blocks with masses m, 2m and 3m are connected by strings, as shown in the figure. After an upward force F is applied on block m, the masses move upward at constant speed v. What is the net force on the block of mass 2m? (g is the acceleration due to gravity)
    (a) 3mg
    (b) 6mg
    (c) zero
    (d) 2mg



12. An explosion breaks a rock into three parts in a horizontal plane. Two of them go off at right angles to each other. Thefirst part of mass 1 kg moves with a speed of12 m s^{-1} and the second part of mass 2 kg moves with 8 m s^{-1} speed. If the third part flies off with 4 ms^{-1}speed , then its mass is
    (a) 7 Kg
    (b) 17 kg
    (c) 3 Kg
    (d) 5 kg

13. The upper half of an inclined plane of inclination θ is perfectly smooth while lower half is rough. A block starting from rest at the top of the plane will again come to rest at the bottom, if the coefficient of friction between the block and lower half of the plane is given by
    (a) $\mu = 2\tan\theta$
    (b) $\mu = \tan\theta$
    (c) $\mu = {}^{1}/\tan\theta$
    (d) $\mu = {}^{2}/\tan\theta$

14. A car is moving in a circular horizontal track of radius 10 m with a constant speed of 10 m/s. A bob is suspended from the roof of the car by a light wire of length 1.0 m. The angle made by the wire with the vertical is
    (a) $\pi/3$

(b) $\pi/6$
(c) $\pi/4$
(d) 0°

15. A person holding a rifle (mass of person and rifle together is 100 kg) stands on a smooth surface and fires 10 shots horizontally, in 5 s. Each bullet has a mass of 10 g with a muzzle velocity of 800 m s^{-1}. The final velocity acquired by the person and the average force exerted on the person are
(a) -0.08 ms^{-1}, 16N
(b) -0.8 ms^{-1}, 8N
(c) -1.6 ms^{-1}, 16N
(d) -1.6 ms^{-1}, 8N

16. A particle of mass m is driven by a machine that delivers a constant power k watts. If the particle starts from rest the force on the particle at time t is
(a) $\sqrt{2mk}\, t^{-1/2}$
(b) $\frac{1}{2}\sqrt{mk}\, t^{-1/2}$
(c) $\sqrt{mk/2}\, t^{-1/2}$
(d) $\sqrt{mk}\, t^{-1/2}$

17. A block of mass 10 kg. moving in x direction with a constant speed of 10 m s^{-1}, is subjected to a retarding force F = 0.1x J/m during its travel from x = 20 m to 30 m. lts final KE will be
(a) 275 J
(b) 250 J
(c) 475 J
(d) 450 J

18. Two particles of masses m_1, m_2 move with initial velocities u_1 and u_2. On collision, one of the particles get excited to higher level, after absorbing energy ε. If final velocities of particles be v_1 and v_2 then we must have
(a) $\frac{1}{2} m_1u_1^2 + \frac{1}{2} m_2u_2^2 - \varepsilon = \frac{1}{2} m_1v_1^2 + \frac{1}{2} m_2v_2^2$
(b) $\frac{1}{2} m_1^2 u_1^2 + \frac{1}{2} m_2^2 u_2^2 + \varepsilon = \frac{1}{2} m_1^2 v_1^2 + \frac{1}{2} m_2^2 v_2^2$
(c) $m_1^2u_1 + m_2^2u_2 = m_1^2v_1 + m_2^2v_2$
(d) $\frac{1}{2} m_1u_1^2 + \frac{1}{2} m_2u_2^2 = \frac{1}{2} m_1v_1^2 + \frac{1}{2} m_2v_2^2 - \varepsilon$

19. Two similar springs P and Q have spring constants K_P and K_Q such that $K_P > K_Q$. They are stretched first by the same amount (case a), then by the same force (case b). The work done by the springs W_P and W_Q are related as, in case (a) and case (b) respectively
(a) $W_P > W_Q$; $W_Q > W_P$
(b) $W_P < W_Q$; $W_Q < W_P$
(c) $W_P = W_Q$; $W_P > W_Q$
(d) $W_P = W_Q$; $W_P = W_Q$

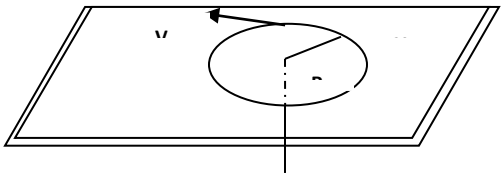
20. A body of mass (4m) is lying in x-y plane at rest. It suddenly explodes into three pieces. Two pieces, each of mass (m) move perpendicular to each other with equal speeds (v). The total kinetic energy generated due to explosion is
(a) mv^2
(b) $3/2\ mv^2$
(c) $2\ mv^2$
(d) $4\ mv^2$

21. A force $\vec{F} = \alpha\hat{\imath} + 3\hat{\jmath} + 6\hat{k}$ is acting at a point $\vec{r} = 2\hat{\imath} - 6\hat{\jmath} - 12\hat{k}$. The value of α for which angular momentum about origin is conserved is
(a) zero
(b) 1
(c) -1
(d) 2

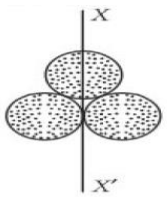
22. A rod of weight W is supported by two parallel knife edges A and B and is in equilibrium in a horizontal position. The knives are at a distance

d from each other. The centre of mass of the rod is at distance x from A. The normal reaction on A is
(a) W(d-x)/x
(b) W(d-x)/d
(c) Wx/d
(d) Wd/x

23. A mass m moves in a circle on a smooth horizontal plane with velocity v_o at a radius Ro. The mass is attached to a string which passes through a smooth hole in the plane as shown. The tension in the string is increased gradually and finally m moves in a circle of radius $R_o/2$ The final value of the kinetic energy is
(a) $2mv_o^2$
(b) ½ mv_o^2
(c) mv_o^2
(d) ¼ mv_o^2

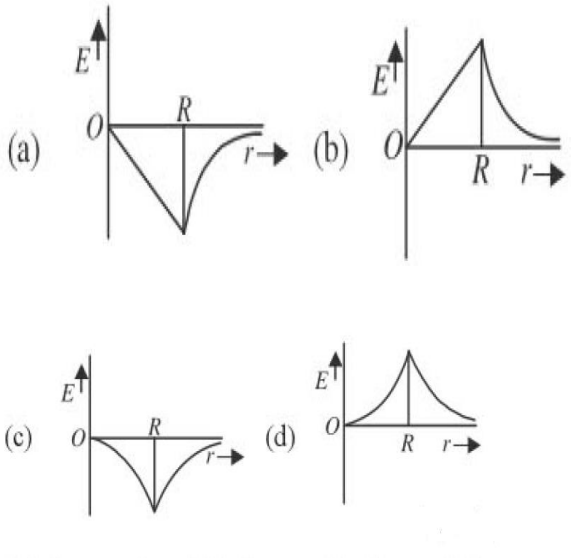


24. Three identical spherical shells, each of mass m and radius r are placed as shown in figure. Consider an axis XX' which is touching to two shells and passing through diameter of third shell. Moment of inertia of the system consisting of these three spherical shells about XX' axis is
(a) 16/5 mr^2
(b) 4 mr^2
(c) 11/5 mr^2
(d) 3 mr^2



25. A solid cylinder of mass 50 kg and radius 0.5 m is free to rotate about the horizontal axis. A massless string is wound round the cylinder with one end attached to it and other hanging freely. Tension in the string required to produce an angular acceleration of 2 revolutions s^{-2} is
(a) 25N
(b) 50N
(c) 78.5N
(d) 157N

26. Dependence of intensity of gravitational field (E) of earth with distance (r) from centre of earth is correctly represented by



27. Infinite number of bodies, each of mass 2 kg are situated on x-axis at distances 1 m, 2 m, 4 m, 8 m, ..., respectively, from the origin. The resulting gravitational potential due to this system at the origin will be
(a) -4/3G
(b) -4 G
(c) -G
(d) -8/3 G

28. A body of mass 'In' is taken from the earth's surface to the height equal to

twice the radius (R) of the earth. The change in potential energy of body will be
(a) 3mgR
(b) 1/3mgR
(c) mg2R
(d) 2/3mgR

29. The radius of a planet is twice the radius of earth. Both have almost equal average mass-densities. V_P and V_E are escape velocities of the planet and the earth, respectively, then
(a) $V_P = 1.5\ V_E$
(b) $V_P = 2\ V_E$
(c) $V_E = 3\ V_P$
(d) $V_E = 1.5\ V_P$

30. A particle of mass 'm' is kept at rest at a height 3R from the surface of earth, where 'R' is radius of earth and 'M' is mass of earth. The minimum speed with which it should be projected, so that it does not return back, is (g is acceleration due to gravity on the surface of earth)
(a) $(GM/2R)^{1/2}$
(b) $(gR/4)^{1/2}$
(c) $(2g/R)^{1/2}$
(d) $(GM/R)^{1/2}$

31. Two non-mixing liquids of densities ρ and nρ (n > 1) are put in a container. The height of each liquid is h. A solid cylinder of length L and density dis put in this container. The cylinder floats with its axis vertical and length pL (p < 1) in the denser liquid. The density d is equal to
(a) {2 + (n - 1)p}ρ
(b) {1 + (n - 1)p}ρ
(c) {1 + (n + 1)p}ρ
(d) {2 + (n + 1)p}ρ

32. The cylindrical tube of a spray pump has radius R, one end of which has n fine holes, each of radius r. If the speed of the liquid in the tube is V, the speed of the ejection of the liquid through the holes is
(a) VR^2/n^3r^2
(b) V^2R/nr
(c) VR^2/n^2r^2
(d) VR^2/nr^2

33. Water rises to a height h in capillary tube. If the length of capillary tube above the surface of water is made less than h, then
(a) water rises upto a point a little below the top and stays there.
(b) water does not rise at all.
(c) Water rises upto the tip of capillary tube and then starts overflowing like a fountain.
(d) Water rises upto the top of capillary tube and stays there without overflowing.

34. The value of coefficient of volume expansion of glycerin is $5 \times 10^{-4} K^{-1}$. The fractional change in the density of glycerin for a rise of 40°C in its temperature, is
(a) 0.025
(b) 0.010
(c) 0.015
(d) 0.020

35. The Young's modulus of steel is twice that of brass. Two wires of same length and of same area of cross section, one of steel and another of brass are suspended from the same roof. If we want the lower ends of the wires to be at the same level, then the weights added to the steel and brass wires must be in the ratio of
(a) 4: 1
(b) 1: 1
(c) 1 : 2

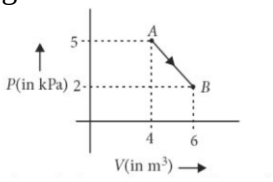
(d) 2 : 1

36. The coefficient of performance of a refrigerator is 5. If the temperature inside freezer is -20°C, the temperature of the surroundings to which it rejects heat is
(a) 11°C
(b) 21°C
(c) 31°C
(d) 41°C

37. The ratio of the specific heats $C_p/C_v = \gamma$ in terms of degrees of freedom (n) is given by
(a) $(1 + {}^{2}/n)$
(b) $(1 + {}^{n}/2)$
(c) $(1 + {}^{1}/n)$
(d) $(1 + {}^{n}/3)$

38. A Carnot engine, having an efficiency of as heat engine, is used as a refrigerator. If the work done on the system is 10 J, the amount of energy absorbed from the reservoir at lower temperature is
(a) 90 J
(b) 1 J
(c) 100 J
(d) 99 J

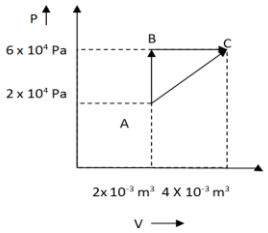
39. One mole of an ideal diatomic gas undergoes a transition from A to B along a path AB as shown in the figure.



The change in the internal energy of the gas during the transition is

(a) 20 J
(b) -12 KJ
(c) 20 KJ
(d) -20 KJ

40. Figure below shows two paths that may be taken by a gas to go from a state A to a State C



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In process AB,400 J of heat is added to the system and in process BC, 100 J of heat is added to the system. The heat absorbed by the system in the process AC will be

(a) 460 J
(b) 300 J
(c) 380 J
(d) 500 J

41. The period of oscillation of a mass M suspended from a spring of negligible mass is T. If along with it another mass M is also suspended, the period of oscillation will now be
(a) T
(b) $T/\sqrt{2}$
(c) 2T
(d) $\sqrt{2}T$

42. 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 = a/2 will he
(a) $\pi a/T$
(b) $3\pi^2 a/T$
(c) $\pi a\sqrt{3}/T$
(d) $\pi a\sqrt{3}/2T$

43. Which one of the following equations of motion represents simple harmonic motion?
    (a) Acceleration = - k (x + a)
    (b) Acceleration = k (x + a)
    (c) Acceleration = Kx
    (d) Acceleration = $-k_o x + /K_1 x^2$ where k, k_o, k_1 , and a are all positive.

44. Two simple harmonic motions of angular frequency 100 and 1000 rad s^{-1} have the same displacement amplitude. The ratio of their maximum acceleration is
    (a) $1 : 10^3$
    (b) $1 : 10^4$
    (c) 1 : 10
    (d) $1 : 10^2$

45. A particle executes simple harmonic oscillation with an amplitude a. The period of oscillation is T. The minimum time taken by the particle to travel half of the amplitude from the equilibrium position is
    (a) T/8
    (b) T/12
    (c) T/2
    (d) T/4.

46. If n1, n2 and n3 are the fundamental frequencies of three segments into which a string is divided, then the original fundamental frequency n of the string is given by
    (a) $^1/n = {}^1/n_1 + {}^1/n_2 + {}^1/n_3$
    (b) $^1/\sqrt{n} = {}^1/\sqrt{n_1} + {}^1/\sqrt{n_2} + {}^1/\sqrt{n_3}$
    (c) $\sqrt{n} = \sqrt{n_1} + \sqrt{n_2} + \sqrt{n_3}$
    (d) $n = n_1 + n_2 + n_3$

47. The number of possible natural oscillations of air column in a pipe closed at one end of length 85 cm whose frequencies lie below 1250 Hz are (Velocity of sound = 340 m s^{-1})
    (a) 4
    (b) 5
    (c) 7
    (d) 6

48. A speeding motorcyclist sees traffic jam ahead him. He slows down to 36 km $hour^{-1}$. He finds that traffic has eased and a car moving ahead ofhim at 18 km $hour^{-1}$ is honking at a frequency of 1392 Hz. If the speed of sound is 343 m s^{-1}, the frequency of the honk as heard by him will be
    (a) 1332 Hz
    (b) 1372 Hz
    (c) 1412 Hz
    (d) 1454 Hz

49. If we study the vibration of a pipe open at both ends, then the following statement is not true.
    (a) All harmonics of the fundamental frequency will be generated.
    (b) Pressure change will be maximum at both ends.
    (c) Open end will be antinode.
    (d) Odd harmonics of the fundamental frequency will be generated.

50. A wave travelling in the +ve x-direction having displacement along y-direction as 1 m, wavelength 2π m and frequency of $1/\pi$Hz is represented by
    (a) $y = \sin(10\pi x - 20\pi t)$
    (b) $y = \sin(2\pi x + 2\pi t)$
    (c) $y = \sin(x - 2t)$
    (d) $y = \sin(2\pi x - 2\pi t)$