NEET PHYSICS 2018-19 - Chennai

Periodic Test : 09 **Test ID :** 021

Number of questions: 150 **Test date: 28.03.2019**

Name: _____ **Time**: 3HRS

ID No: _____

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

1. Consider a drop of rain water having mass 1 g falling from a height of 1 km It hits the ground with a speed of 50 ms^{-1}. Take 'g' constant with a value 10 m s^{-2}.The work doneby the (i) gravitational force and the (ii) resistive force of air is

(a) (i) 0 1.25 J (ii) -8.25 J

(b) (i) 100J (ii) 8.75 J

(c) (i) 10J (ii) -8.75 J

(d) (i) -10J (ii) -8.25 J

2. A bullet of mass 10 g moving horizontally with a velocity of 400ms^{-1} strikes a wood block of mass 2 kg which is suspended by light inextensible string of length 5 m. As a result the centre of gravity of the block found to rise a vertical distance of 10 cm. The speed of the bullet after it emerges out horizontally from the block will be

(a) 100 ms-1

(b) 80ms-1

(c) 120 m s-1

(d) 160ms -1

3. Two identical balls A and B having velocities of 0.5 ms^{-1} and -0.3ms^{-1} respectively collide elastically in one dimension. The velocities of B and A after the collision respectively will be

(a) -0.1ms^{-1} and 0.3 ms^{-1}

(b) 0.1ms^{-1} and -0.3 ms^{-1}

(c) -0.3 ms^{-1} and 0.5 ms^{-1}

(d) 0.3 ms^{-1} and 0.5 ms^{-1}

4. A particle moves from a point ($2\hat{\imath} + 5\hat{\jmath}$) to ($4\hat{\imath} + 3\hat{k}$) when a force of($4\,\hat{\imath} + 3\hat{\jmath}$)N is applied. How much work has been done by the force?

(a) 8J

(b) 11 J

(c) 5 J

(d) 2J

5. A particle of mass 10 g moves along a circle of radius 6.4 cm with a constant tangential acceleration. What is the magnitude of this acceleration if the kinetic energy of the particle becomes equal to 8 x 10^{-4} J by the end of the second revolution after the beginning of the motion?

(a) 0.18 ms^2

(b) 0.2 ms^2

(c) 0.1ms^2

(d) 0.15 ms^2

6. A body of mass I kg begins to move under the action of a time dependent force

$\hat{F} = (2t\hat{\imath} + 3t^2\,\hat{\jmath})$ N, where $\hat{\imath}$ and $\hat{\jmath}$ are unit vectors along x and y axis what power will be developed by the force at the time t?

(a) $(2t^3 + 3t^4)$ W

(b) $(2t^3 + 3t^5)$ W

(c) $(2t^2 + 3t^3)$ W

(d) $(2t^2 + 4t^4)$ W

7. What is the minimum velocity with which a body of mass m must enter a vertical loop of radius R so that it can complete the loop?

(a) $\sqrt{3gR}$

(b) $\sqrt{5gR}$

(c) $\sqrt{gR}$

(d) $\sqrt{2gR}$

8. Two particles A and B, move with constant velocities $\overrightarrow{v_1}$ and $\overrightarrow{v_2}$. At the initial moment their position vectors are $\overrightarrow{r_1}$ and $\overrightarrow{r_2}$ respectively. The condition for particles A and B for their collision is

(a) $\overrightarrow{r_1}$ x $\overrightarrow{v_1}$ = $\overrightarrow{r_2}$ x $\overrightarrow{v_2}$

(b) $\overrightarrow{r_1}$ - $\overrightarrow{r_2}$ = $\overrightarrow{v_1}$ - $\overrightarrow{v_2}$

(c) $\frac{\overrightarrow{r_1} - \overrightarrow{r_2}}{[\overrightarrow{r_1} - \overrightarrow{r_2}]} = \frac{\overrightarrow{v_2} - \overrightarrow{v_1}}{[\overrightarrow{v_2} - \overrightarrow{v_1}]}$

(d) $\overrightarrow{r_1} \cdot \overrightarrow{v_1} = \overrightarrow{r_2} \cdot \overrightarrow{v_2}$

9. The heart of a man pumps 5 litres of blood through the arteries per minute at a pressure of 150 mm of mercury. If the density of mercury be 13.6 x 10^3 kg/mg^3 and g =10 ms^2 then the Power (in watt) is

(a) 3.0

(b) 1.50

(c) 1.70

(d) 2.35

10. A bail is thrown vertically downwards from a height of 20 m with an initial velocity v_0 It collides with the ground, loses 50 percent of its energy in collision and rebounds to the same height. The initial velocity v_0 is (Take g=10 ms^{-2})

(a) 28 ms^{-1}

(b) 10 ms^{-1}

(c) 14 ms^{-1}

(d) 20 ms^{-1}

11. on a frictionless surface, a block of mass M moving at speed V collides elastically with another block of same mass M which is initially at rest. After collision the first block moves at angle Θ to its initial direction and has a speed $\frac{v}{3}$, the second block speed after the collision is

(a) $\frac{3}{\sqrt{2}}V$

(b) $\frac{\sqrt{3}}{2}V$

(c) $\frac{2\sqrt{2}}{3}V$

(d) $\frac{3}{4}$V

12. A particle of mass m is driven by a machine that delivers 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) $\sqrt{\frac{mk}{2}}\ t^{-1/2}$

(d) $\sqrt{mk}\ t^{-1/2}$

13. A block of mass 10 kg, moving in x direction with a constant speed of 10 ms^{-1} is subjected to a retarding force F = 0.1x J/m during its travel from x = 20 m to 30 m. Its final KE will be

(a) 275 J

(b) 250J

(c) 475J

(d) 450J

14. 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) $m_1^{\ 2}u_1 + m_2^{\ 2}u_2 - \varepsilon = m_1^{\ 2}v_1 + \frac{1}{2}\ m_2^{\ 2}v_2$

(d) $\frac{1}{2}\ m_1u_1^{\ 2} + \frac{1}{2}\ m_2u_2^{\ 2} = \frac{1}{2}\ m_1v_1^{\ 2} + \frac{1}{2}\ m_2v_2^{\ 2} - \varepsilon$

15. 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) $W_p = W_Q$; $W_p = W_Q$

16. 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

(a) mv^2

(b) $\frac{3}{2}mv^2$

(c) $2mv^2$

(d) $4mv^2$

17. A uniform force of $3\hat{\imath} + \hat{\jmath}$ newton acts on a particle of mass 2 kg. Hence the particle is displaced from position $2\hat{\imath} + \hat{k}$ metre to position $4\hat{\imath} + 3\hat{\jmath} - \hat{k}$ metre. The work done by the force on the particle is

(a) 13 J

(b) 15 J

(c) 9 J

(d) 6J

18. A particle with total energy E is moving in a potential energy region U(x). Motion of the particle is restricted to the region when

(a) U(x) < E

(b) U(x) = 0

(c) U(x) ≤ E

(d) U(x) > E

19. One coolie takes minute to raise a suitcase through a height of 2 m but the second coolie takes 30s to raise the same suitcase to the same height. The powers of two coolies are in the ratio

(a) 1:3

(b) 2:1

(c) 3:1

(d) 1:2

20. The potential energy of' a particle in a force field is U = $\frac{A}{r^2}$ - $\frac{B}{r}$ where A and B are positive constants and r is the distance of particle from the centre of the field. For stable equilibrium, the distance of the particle is

(a) $\frac{B}{2A}$

(b) $\frac{2A}{B}$

(c) $\frac{A}{B}$

(d) $\frac{B}{A}$

21. A solid cylinder of mass 3 kg is rolling on a horizontal surface with velocity 4 ms^{-1}. It Collides with a horizontal spring of force constant 200 Nm^{-1}. The maximum compression produced in the spring will be

(a) 0.5m

(b) 0.6m

(c) 0.7m.

(d) 0.2m

22. Two spheres A and B of masses m1, and m2, respectively collide. A is at rest initially and B is moving with velocity v along x-axis. After collision B has a velocity in a direction Perpendicular to the original direction. The mass A moves after collision in the direction

(a) same as that of B

(b) opposite to that of B

(c) Θ= $\tan^{-1}(\frac{1}{2})$ to the x-axis

(d) Θ= $\tan^{-1}(-\frac{1}{2})$ to the x-axis

23. A car of mass m starts from rest and accelerates so that the instantaneous power delivered to the car has a constant magnitude Po.The instantaneous velocity of this proportional to

(a) t^2p_o

(b) $t^{1/2}$

(c) $t^{-1/2}$

(d) $\frac{t}{\sqrt{m}}$

24. The potential energy of a system increases if work is done

(a) Upon the system by a non conservative force.

(b) By the system against a conservative force

(c) By the system against a neoconservative force.

(d) Upon the system by a conservative force.

25. A body projected vertically from the earth reaches a height equal to earth's radius before returning to the earth. The power exerted by the gravitational force is greatest

(a) at the highest position of the body

(b) at the instant just before the body hits the earth.

(c) it remains constant all through.

(d) at the instant just after the body is projected.

26. A stationary particle explodes into two particles of masses m_1 and m_2 which move in opposite directions with velocity v_1 and v_2.The ratio of their kinetic energies E_1/E_2 is

(a) m_2/m_1

(b) m_1/m_2

(c) 1

(d) $m_1/v_2/m_2v_1$

27. If kinetic energy of body is increased by 300 % then percentage change in momentum will be

(a) 100%

(b) 150%

(c) 265%

(d) 73.2%

28. A child is sitting on a swing. Its minimum and maximum heights from the ground 0.75 m and 2m respectively, its maximum speed will be

(a) 10 m/s

(b) 5 m/s

(c) 8 m/s

(d) 15 m/s.

29. Two springs A and B having spring constant K_A and K_B ($K_A = 2K_B$) are stretched by applying force of equal magnitude. If energy stored in spring A is E_A then energy stored in B will be

(a) $2E_A$

(b) $E_A / 4$

(c) $E_A / 2$

(d) $4E_A$

30. A particle is projected making an angle of 45^0 with horizontal having kinetic energy K. The kinetic energy at highest point will be

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

(b) $\frac{K}{2}$

(c) 2K

(d) K

31. If $\hat{F} = (60\hat{\imath} + 15\hat{\jmath} - 3\hat{k})$ N and $\hat{v} = (2\hat{\imath} - 4\hat{\jmath} + 5\hat{k})$ m/s then instantaneous power is

(a) (a) 195 watt

(b) 45 watt

(c) 75 watt

(d) 100 watt.

32. A mass of 1 kg, is thrown up with a velocity, of 100 m/s. After 5 seconds, it explodes into two parts. One part of mass 400 g comes down with a velocity 25 m/s. The velocity of other part is (Take g= 10 ms^{-2})

(a) 40 m/s
(b) 40 m/s
(c) 100 m/s
(d) 60 m/s

33. Two bodies with kinetic energies in the ratio of 4 :1 are moving with equal linear momentum. The ratio of their masses is

(a) 4 1
(b) 1:1
(c) 1:2
(d) 1: 4

34. Two equal masses m1 and m2, moving along the same straight line with velocities +3 m/s and –5m/s respectively collide elastically. Their velocities after the collision will be respectively

(a) -4 m/s and +4 m/s
(b) +4 m/s for both
(c) -3 rn/s and +5 m/s
(d) -5 m/s and + 3 m/s.

35. A force acts on a 3 g particle in such a way that the position of the particle as a function of time is given by $3t - 4t^2 + t^3$ where x is in metres and t is in seconds. The work done during the first 4 second is

(a) 490 mJ
(b) 450 mJ
(c) 576 mJ
(d) 530 mJ

36. A shell, in flight, explodes into four unequal parts. Which of the following is conserved?

(a) Potential energy
(b) Momentum
(c) Kinetic energy
(d) Both (a) and (c)

37. Two bodies of mass m and 4m are moving with equal kinetic energies. The ratio of their linear momenta is

(a) 1: 2
(b) 1: 4
(c) 4: 1
(d) 1: 1.

38. A metal ball of mass 2g moving with speed of 36 km/h has a head on collision with a stationary ball of mass 3g. If after collision, both the balls move as a single mass, then the loss in K. E. due to collision is

(a) 100J
(b) 140J
(c) 40J
(d) 60J

39. A body of moves a distance of 10 m along a straight line under the action of a 5 N force. If the work done is 25J, then angle between the force and direction of motion of the body is

(a) 60^0

(b) 75^0

(c) 30^0

(d) 45°.

40. A moving body of mass m and velocity 3 km/hour collides with a rest body of mass 2.m and sticks to it. Now the combined mass starts to move what will be the combined velocity?

(a) 3 km/hour

(b) 4 km/hour

(c) 1 km/hour

(d) 2 km/hour

41. The potential energy between two atoms, in a molecule, is given by U (x) = $\frac{a}{x^{12}} - \frac{b}{x^6}$ Where a and b are positive constants and x is the distance between the atoms. The atom is in stable equilibrium when

(a) X = $\left[\frac{2}{a}\right]^{1/6}$

(b) X = $\left[\frac{11b}{5b}\right]^{1/6}$

(c) X =o

(d) X = $\left[\frac{a}{2b}\right]^{\frac{1}{6}}$

42. A body, constrained to move in y-direction, is subjected to force given by ($\hat{F} = -2\hat{\imath} + 15\hat{\jmath} + 6\hat{k}$) N the work done by this force in moving the body through a distance of $10\hat{\jmath}$ m along y axis

(a) 150J

(b) 20J

(c) 190 J

(d) 160J

43. The kinetic energy acquired by a mass m in traveling distance d, starting from rest, under the action of a constant force is directly proportional to

(a) m

(b) m°

(c) $\sqrt{m}$

(d) 1/ $\sqrt{m}$

44. A position dependent force, F= (7 – 2x+ $3x^2$) N acts on a small body of mass 2 kg and displaces it from x = 0 to x = 5 m, The work done in joule is

(a) 135

(b) 270

(c) 35

(d) 70

45. When a body moves with a constant speed along a circle

(a) No work is done on it

(b) No acceleration is produced in it

(c) Its velocity remains constant

(d) No force acts on it

46. Two masses of 1 g and 9 g are moving with equal kinetic energies. The ratio of the magnitudes of their respective linear momenta is

(a) 1 : 9
(b) 9: 1
(c) 1 : 3
(d) 3 : 1

47. A particle of mass M is moving in a horizontal circle of radius R with uniform speed v, when it moves from one point to a diametrically opposite point, its

(a) kinetic energy change by $Mv^2/4$
(b) momentum does not change
(c) momentum change by 2Mv
(d) kinetic energy changes by Av^2

48. How much water a pump of 2 kW can raise in one minute to a height of 10 m (Take g = 10 m/s^2)

(a) 1000 litres
(b) 1200 litres
(c) 100 litres
(d) 2000 litres

49. A bullet of mass 10 g leaves a rifle at an initial velocity of 1000 m/s and strikes the earth at the same level with a velocity of 500 m/s.The work done in joule overcoming the resistance of air will be

(a) 375
(b) 3750
(c) 5000
(d) 500

50. The coefficient of restitution e for a perfectly elastic collision

(a) 1
(b) 0
(c) ∞
(d) -1