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Class: XI
Subject: Physics
Topic: Work Energy and Power
No. of Questions: 20

Q1. A man pushes against a wall but fails to move it. He did

a. negative work
b. positive but not maximum work
c. maximum positive work
d. no work at all

Q2. Which of the following options is a form of energy?

a. Light
b. Pressure
c. Momentum
d. Force

Q3. Water is falling on the blades of a turbine at a rate of 6000 kg/min. The height of the fall is 100 m. The power given to the turbine is (Take g = 10 m/s^2)

a. 10 kW
b. 6 MW
c. 100 kW
d. 150 kW

Q4. A particle of mass 100 g is thrown vertically upwards with a speed of 5 m/s. The work done by the force of gravity, during the time the particle goes up is

a. 0.5 J
b. 1.25 J
c. 1.25 J
d. 0.5 J

Q5. When a body moves in a circular path, no work is done by the force, since

a. force and displacement are perpendicular to each other
b. the force is always away from the center
c. there is no displacement
d. there is no net force

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Q6. A particle accelerating uniformly has velocity 'v' at time 't_1'. What is work done in time't'?

a. $\frac{1}{2}\frac{mv^2}{t_1^2}t^2$

b. $\frac{1}{2}\left(\frac{mv}{t_1}\right)^2 t^2$

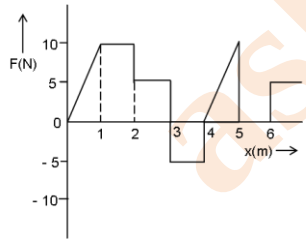
c. $\frac{mv^2}{t_1^2}t^2$

d. $\frac{2mv^2}{t_1^2}t^2$

Q7. Two objects of masses 1 kg and 2 kg are moving along the same line and direction with velocities of 15 ms^{-1} and 10 ms^{-1}, respectively. After they collide, the first object moves at a velocity of 10 ms^{-1}, the velocity of the second object is

a. 15 ms^{-1}
b. 12.5 ms^{-1}
c. 10 ms^{-1}
d. 8.5 ms^{-1}

Q8. The relationship between the force 'F' and position 'x' of a body is as shown in the figure. What will be the work done in displacing the body from 'x = 1' m to 'x = 5' m?



a. 30 J
b. 15 J
c. 25 J
d. 29 J

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Q9. A body of mass 'm' is accelerated uniformly from rest to a speed 'v' in a time 'T'. The Instantaneous power delivered by the body as a function of time, is given by

a. $\frac{mv^2}{T^2}t$

b. $\frac{mv^2}{T^2}t^2$

c. $\frac{1}{2}\frac{mv^2}{T^2}t$

d. $\frac{1}{2}\frac{mv^2}{T^2}t^2$

Q10. The momentum of a body increases by 20%. What is the percentage increase in its kinetic energy?

a. 36
b. 44
c. 52
d. 60

Q11. A 20 g bullet pierces through a plate of mass M_1 = 1 kg and then comes to rest inside a second plate of mass M_2 = 2.98 kg. It is found that the two plates, initially at rest, now move with equal velocities. What is the percentage loss in the initial velocity of the bullet when it is between M_1 and M_2. Neglect any loss of material of the plates due to the action of bullet?

a. 25%
b. 35%
c. 40%
d. 60%

Q12. A car is moving along a straight road. If its engine is delivering constant power, then the distance covered by the car in time t is proportional to

a. $t^{1/2}$
b. $t^{2/3}$
c. $t^{3/2}$
d. t^2

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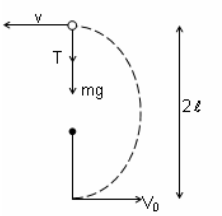
Q13. Find the work done by a force given (in N) by $F_x = (5x - 4)$, when this force acts on a particle that moves from x = 1 m to x = 3 m.

a. 2 J
b. 16 J
c. 3 J
d. 2 J

Q14. A mass m is attached to the end of a rod of length l. The mass goes around a vertical circular path with the other end hinged at the centre. What should be the minimum velocity of mass at the bottom of the circle so that the mass completes the circle?



a. $\sqrt{4gl}$
b. $\sqrt{3gl}$
c. $\sqrt{5gl}$
d. $\sqrt{gl}$

Q15. An automobile travelling with a speed of 60 km/hr can stop within a distance of 20 m. If the car travels twice as fast, i.e. 120 km/hr, then the automobile will stop within a distance of

a. 20 m
b. 40 m
c. 60 m
d. 80 m

Q16. The displacement x of a particle varies with time t as $x = ae^{-\alpha t} + be^{\beta t}$, where a, b, α and β are positive constants. The velocity of the particle will

a. go on decreasing with time
b. be independent of α and β
c. drop to zero when α = β
d. go on increasing with time

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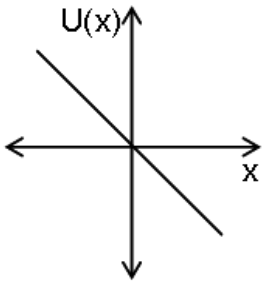
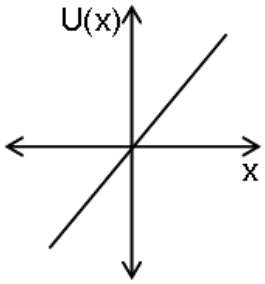
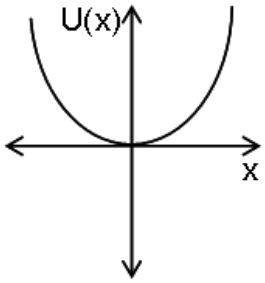
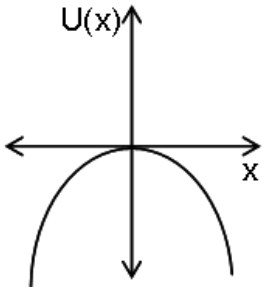
Q17. A particle is placed at the origin and a force F = Kx is acting on it (where K is positive constant). If u (0) = 0, the graph of u(x) versus x will be (where u is potential energy function)

a. 

b. 

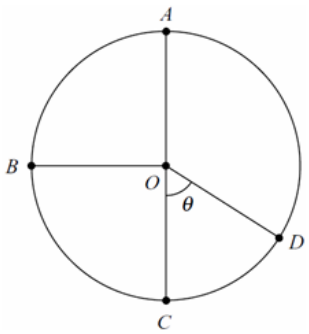
c. 

d. 

Q18. A body constrained to move in y-direction is subjected to a force $\vec{F} = 2\hat{i} + 15\hat{j} + 6\hat{k}$ N. The work done by this force in moving the body through a distance of 10 m along y-axis is

a. 100 J
b. 150 J
c. 120 J
d. 200 J

Q19. **Directions:** An object of mass m is whirled with a constant speed v in a vertical circle with centre O and radius R. T_1, T_2, $T_3$and T_4 are the tensions in the string when the object is at A (top of the circle), B, C (the lowermost point of the circle) and D respectively (as shown in the figure).



The minimum speed the object must have at the highest point A to complete the circle is

a. $\sqrt{\frac{Rg}{2}}$
b. $\sqrt{Rg}$
c. $\sqrt{2Rg}$
d. $2\sqrt{Rg}$

Q20. **Directions:** A conical pendulum consists of a string of length L, fixed at one end and carrying a body of mass m at the other end. The mass is revolved in a circle in the horizontal plane about a vertical axis passing through the fixed end of the string. The angular frequency of revolution of the body is ω. The string makes an angle θ with the vertical axis. The tension in the string is

a. $\frac{m\omega^2}{L}$

b. $\frac{L\omega^2}{m}$

c. $m\omega^2 L$

d. $m\omega L^2$