DPP
DAILY PRACTICE PROBLEMS

CLASS : XITH **SUBJECT : PHYSICS**
DATE : **DPP NO. :2**

Topic :- WORK ENERGY AND POWER

1. An electric motor creates a tension of 9000 N in a hoisting cable and reels it in at the rate of $2\ \text{ms}^{-1}$. The power of the electric motor is
   a) 18 kW b) 15 kW c) 81 W d) 225 W

2. The potential energy of a particle of mass 5 kg moving in the $x-y$ plane is given by $U=(-7x+24y)$ J, x and y being in metre. Initially at $t=0$ the particle is at the origin (0, 0) moving with a velocity of $(2.4\hat{\mathbf{i}}+0.7\hat{\mathbf{j}})\text{ms}^{-1}$. The magnitude of force on the particle is
   a) 25 units b) 24 units c) 7 units d) None of these

3. **Statement I** In an elastic collision between two bodies, the relative speed of the bodies after collision is equal to the relative speed before the collision.
   Statement II Inan elastic collision, the linear momentum of the system is conserved.
   a) Statement I is true ,statement II is true; statement II is a correct explanation for statement I
   b) Statement I is true, Statement II is true; statement II is not correct explanation for statement I
   c) Statement I is true, Statement II is false
   d) Statement I is false, Statement II is True

4. A body of mass $2\ kg$ is moving with velocity $10\ m/s$ towards east. Another body of same mass and same velocity moving towards north collides with former and coalesces and moves towards north-east. Its velocity is
   a) $10\ m/s$ b) $5\ m/s$ c) $2.5\ m/s$ d) $5\sqrt{2}\ m/s$

5. Two bodies of masses $2m$ and m have their K.E. in the ratio $8:1$, then their ratio of momenta is
   a) $1:1$ b) $2:1$ c) $4:1$ d) $8:1$

6. A spring with spring constant k is extended from $x=0$ to $x=x_1$. The work done will be
   a) kx_1^2 b) $\frac{1}{2}kx_1^2$ c) $2kx_1^2$ d) $2kx_1$

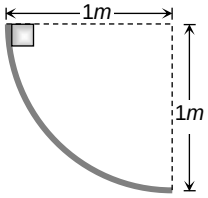
7. A spring of spring constant $5\times10^3\ N/m$ is stretched initially by $5\ cm$ from the unstretched position. Then the work required to stretch it further by another $5cm$ is
   a) $6.25\ N\text{-}m$ b) $12.50\ N\text{-}m$ c) $18.75\ N\text{-}m$ d) $25.00\ N\text{-}m$

8. A uniform force of 4 N acts on a body of mass 10 kg for a distance of 2.0 m. The kinetic energy acquired by the body is
   a) $4\times2\times2$ J b) $4\times4\times2\times10^8$ erg c) 4×2 J d) $4\times4\times2$ erg

9. The potential energy function for the force between two atoms in a diatomic molecule is approximately given by $U(x)=\frac{a}{x^{12}}-\frac{b}{x^6}$, where a and b are constants and x is the distance between the atoms. If the dissociation energy of the molecule is $D=[U(x=\infty)-U_{\text{at equilibrium}}]$, D is

a) $\frac{b^2}{6a}$ b) $\frac{b^2}{2a}$ c) $\frac{b^2}{12a}$ d) $\frac{b^2}{4a}$

10. A body of mass $2\ kg$ slides down a curved track which is quadrant of a circle of radius $1\ metre$. All the surfaces are frictionless. If the body starts from rest, its speed at the bottom of the track is



a) $4.43\ m/sec$ b) $2\ m/sec$ c) $0.5\ m/sec$ d) $19.6\ m/sec$

11. A ball is dropped from height 20 m. If coefficient of restitution is 0.9, what will be the height attained after first bounce?
a) $1.62\ m$ b) 16.2 m c) 18 m d) 14 m

12. The bodies of masses $1\ kg$ and $5\ kg$ are dropped gently from the top of a tower. At a point $20\ cm$ from the ground, both the bodies will have the same
a) Momentum b) Kinetic energy c) Velocity d) Total energy

13. You lift a heavy book from the floor of the room and keep it in the book–shelf having a height $2\ m$. In this process you take $5\ seconds$. The work done by you will depend upon
a) Mass of the book and time taken
b) Weight of the book and height of the book-shelf
c) Height of the book-shelf and time taken
d) Mass of the book, height of the book-shelf and time taken

14. A sphere of mass m moving with a constant velocity u hits another stationary sphere of the same mass. If e is the coefficient of restitution, then the ratio of the velocity of two spheres after collision will be
a) $\frac{1-e}{1+e}$ b) $\frac{1+e}{1-e}$ c) $\frac{e+1}{e-1}$ d) $\frac{e-1}{e+1}t^2$

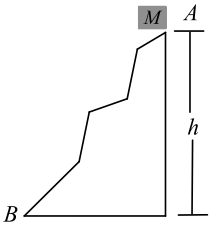
15. A box is moved along a straight line by a machine delivering constant power. The distance moved by the body in time t is proportional to
a) $1^{1/2}$ b) $t^{3/4}$ c) $t^{3/2}$ d) t^2

16. An engine pumps water continuously through a hole. Speed with which water passes through the hole nozzle is v and k is the mass per unit length of the water jet as it leaves the nozzle. Find the rate at which kinetic energy is being imparted to the water
a) $\frac{1}{2}kv^2$ b) $\frac{1}{2}kv^3$ c) $\frac{v^2}{2k}$ d) $\frac{v^3}{2k}$

17. The area of the acceleration-displacement curve of a body gives
a) Impulse
b) Change in momentum per unit mass
c) Change in KE per unit mass
d) Total change in energy

18. A car of mass 'm' is driven with acceleration 'a' along a straight level road against a constant external resistive force 'R'. When the velocity of the car is 'V', the rate at which the engine of the car is doing work will be
a) RV b) maV c) $(R+ma)V$ d) $(ma-R)V$

19. In the given curved road, if particle is released from A then



a) Kinetic energy at B must be mgh
b) Kinetic energy at B may be zero
c) Kinetic energy at B must be less than mgh
d) Kinetic energy at B must not be equal to zero

20. Two springs A and B are identical but A is harder than $B(k_A > k_B)$. Let W_A and W_B represent the work done when the springs are stretched through the same distance and W'_A and W'_B are the work done when these are stretched by equal forces, then which of the following is true

a) $W_A > W_B$ and $W'_A = W'_B$
b) $W_A > W_B$ and $W'_A < W'_B$
c) $W_A > W_B$ and $W'_A > W'_B$
d) $W_A < W_B$ and $W'_A < W'_B$