PRERNA EDUCATION
IIT-JEE | NEET | BOARDS | NTSE | KVPY | OLYMPIADS

Chapter : WORK ENERGY AND POWER

Assignment 3

Class 11

DPP
DAILY PRACTICE PROBLEMS

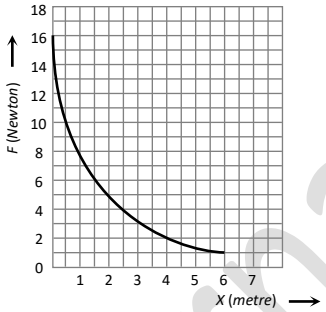
CLASS : XITH **SUBJECT : PHYSICS**
DATE : **DPP NO. :3**

Topic :- WORK ENERGY AND POWER

1. The bob of a simple pendulum (mass m and length l) dropped from a horizontal position strikes a block of the same mass elastically placed on a horizontal frictionless table. The K.E. of the block will be

a) $2\,mgl$ b) $mgl/2$ c) mgl d) 0

2. The relation between the displacement X of an object produced by the application of the variable force F is represented by a graph shown in the figure. If the object undergoes a displacement from $X = 0.5\ m$ to $X = 2.5\ m$ the work done will be approximately equal to



a) $16\ J$ b) $32\ J$ c) $1.6\ J$ d) $8\ J$

3. The potential energy as a function of the force between two atoms in a diatomic molecules 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 position of stable equilibrium for the system of the two atoms is given

a) $x = \frac{a}{b}$ b) $x = \sqrt{\frac{a}{b}}$ c) $x = \frac{\sqrt{3a}}{b}$ d) $x = \sqrt[6]{\left(\frac{2a}{b}\right)}$

4. Consider elastic collision of a particle of mass m moving with a velocity u with another particle of the same mass at rest. After the collision the projectile and the stuck particle move in directions making angles θ_1 and θ_2 respectively with the initial direction of motion.
The sum of the angles $\theta_1 + \theta_2$

a) $45°$ b) $90°$ c) $135°$ d) $180°$

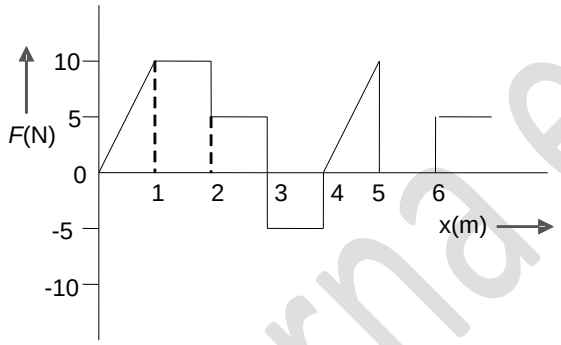
5. If the $K.E.$ of a particle is doubled, then its momentum will
   a) Remain unchanged b) Be doubled c) Be quadrupled d) Increase $\sqrt{2}$ times

6. Two springs have force constants k_1 and k_2. There are extended through the same distance x. If their elastic energies are E_1 and E_2, then $\frac{E_1}{E_2}$ is equal to
   a) $k_1 : k_2$ b) $k_2 : k_1$ c) $\sqrt{k_1} : \sqrt{k_2}$ d) $k_1^2 : k_2^2$

7. A uniform chain of length L and mass M overhangs a horizontal table with its two-third part on the table. The friction coefficient between the table and the chain is μ. The work done by the friction during the period the chain slips off the table is
   a) $-\frac{1}{4}\ \mu MgL$ b) $-\frac{2}{9}\ \mu MgL$ c) $-\frac{4}{9}\ \mu MgL$ d) $-\frac{6}{7}\ \mu MgL$

8. If a shell fired from a cannon ,explodes in mid air, then
   a) Its total kinetic energy increases b) Its total momentum increases
   c) Its total momentum decreases d) None of the above

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



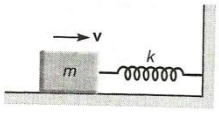
   a) 30 J b) 15 J c) 25 J d) 20 J

10. A particle is moving under the influence of a force given by $F = kx$, where k is a constant and x is the distance moved. The energy (in joule)gained by the particle in moving from $x = 0\ to\ x = 3\ is$
    a) 2 k b) 3.5 k c) 4.5 k d) 9 k

11. A horizontal force of $5N$ is required to maintain a velocity of 2 m/s for a block of 10 kg mass sliding over a rough surface. The work done by this force in one minute is
    a) 600 J b) 60 J c) 6 J d) 6000 J

12. A force of $5N$, making an angle θ with the horizontal, acting on an object displaces it by $0.4m$ along the horizontal direction. If the object gains kinetic energy of $1J$, the horizontal component of the force is
    a) 1.5 N b) 2.5 N c) 3.5 N d) 4.5 N

13. A block of mass $m = 25\text{kg}$ sliding on a smooth horizontal surface with a velocity $v = 3\text{ms}^{-1}$ meets the spring of spring constant $k = 100\text{Nm}^{-1}$ fixed at one end as shown in figure. The maximum compression of the spring and velocity of block as is returns to the original position respectively are



a) 1.5 m, $-3\ \text{ms}^{-1}$ b) 1.5 m, $0.01\ \text{ms}^{-1}$
c) 1.0 m, $3\ \text{ms}^{-1}$ d) 0.5 m, $2\ \text{ms}^{-1}$

14. Which of the following is not a perfectly inelastic collision
a) Striking of two glass balls b) A bullet striking a bag of sand
c) An electron captured by a proton d) A man jumping onto a moving cart

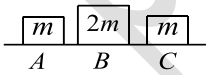
15. A pump motor is used to deliver water at a certain rate from s given pipe. To obtain twice as much water from the same pipe in the same time, power of the motor has to be increased to
a) 16 times b) 4 times c) 8 times d) 2 times

16. A body of mass 1 kg is thrown upwards with a velocity 20 m/s. It momentarily comes to rest after attaining a height of 18 m. How much energy is lost due to air friction ($g = 10\ m/s^2$)
a) 20 J b) 30 J c) 40 J d) 10 J

17. A cylinder of mass $10kg$ is sliding on a plane with an initial velocity of 10 m/s. If coefficient of friction between surface and cylinder is 0.5, then before stopping it will describe
a) 12.5 m b) 5 m c) 7.5 m d) 10 m

18. Two springs of spring constants 1500 N/m and 3000 N/m respectively are stretched with the same force. They will have potential energy in the ratio
a) 4 : 1 b) 1 : 4 c) 2 : 1 d) 1 : 2

19. Three objects A, B and C are kept in a straight line on a frictionless horizontal surface. These have masses m, $2m$ and m respectively. The object A moves towards B with a speed 9 m/s and makes an elastic collision with it. Thereafter, B makes completely inelastic collision with C. All motions occur on the same straight line. Find the final speed (in m/s) of the object C



a) 3 m/s b) 4 m/s c) 5 m/s d) 1 m/s

20. Four smooth steel balls of equal mass at rest are free to move along a straight line without friction. The first ball is given a velocity of $0.4\ \text{ms}^{-1}$. It collides head on with the second one elastically, the second one similarly with the third and so on. The velocity of the last ball is
a) 0.4ms^{-1} b) 0.2ms^{-1} c) 0.1ms^{-1} d) 0.05ms^{-1}