WORK AND ENERGY
EXERCISE 1

1. If the unit of force and length be each increased by four times, then the unit of energy is increased by
a) 16 times b) 8 times
c) 2 times d) 4 times

2. A light and heavy body have equal momentum . Which one has greater kinetic energy ?
a) the light body b) both have equal K.E.
c) the heavy body d) data given is incomplete

3. A light and heavy body have equal kinetic energy which has greater momentum ?
a) the heavy body b) the light body
c) both have equal momentum d) data given is incomplte

4. A moving train is stopped by applying certain force. If the speed is doubled then the distance will be

a) the same
b) doubled
c) half
d) four times

5. A metal ball falls from a height of 10 metre on a steel plate and bounces back to a height of 2.5 metre. The coefficient of restitution of the ball is

a) 0.5
b) 0.25
c) 0.75
d) 0.33

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

a) $\sqrt{m}$
b) independent of m
c) $1/\sqrt{m}$
d) m

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

a) 30°
b) 45°
c) 60°
d) 75°

8. The kinetic energy acquired by a mass m after traveling a fixed distance from rest under the action of constant force is

a) directly proportional to $\sqrt{m}$
b) inversely proportional to $\sqrt{m}$
c) directly proportional to m
d) independent of m

9. One man takes 1 minute to raise a box to a height of 1 metre and another man takes 30 second to do the same. The energy of the two is

a) different
b) same
c) energy of the first is more
d) energy of the second is more

10. A particle moves under the effect of a force F = cx from x = 0 to x = x_1 . The work done in the process is

a) cx_1^2
b) $\frac{1}{2}cx_1^2$
c) cx_1^3
d) zero

11. One kilowatt hour is equal to

a) 36×10^5 J
b) 36×10^3 J
c) 36×10^{-5} J
d) 36×10^{-3} J

12. A body 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) $t^{1/2}$ b) $t^{3/4}$
c) $t^{3/2}$ d) t^2

13. A uniform chain of length L and mass M is lying on a smooth table and one–third of its lying on a smooth table and one–third of its length is hanging vertically down over the edge of the table. If g is acceleration due to gravity , the work required to pull the hanging part on to the table is

a) MgL b) MgL/3
c) MgL/9 d) mgL/18

14. A long spring is stretched by 2 cm , its potential energy is U . If the spring is stretched by 10 cm, the potential energy stored in it will be

a) U/25 b) U/5
c) 5 U d) 25 U

15. A body moves a distance of 10 m along a straight line under the action of a force of 5 N. If the work done is 25 joule, the angle which the force makes with the direction of motion of the body is

a) 0° b) 30°
c) 60° d) 90°

EXERCISE II

1. A long spring is stretched by 2 cm. Its potential energy is U .If the spring is stretched by 10 cm, the potential energy stored in it will be

a) U/25 b) U/5
c) 5 U d) 25 U

2. A ball with kinetic energy E is thrown at an angle of 45° with horizonal , its kinetic energy at the highest point of its flight will be

a) E b) E/ $\sqrt{2}$
c) E/2 d) zero

3. A bullet of mass a and velocity b is fired into a large block of mass c. The final velocity of the system is

a) $\left(\frac{c}{a+b}\right).b$ b) $\left(\frac{a}{a+c}\right).b$

c) $\left(\frac{a+b}{c}\right).a$ d) $\left(\frac{a+c}{a}\right).b$

4. A boy and a man carry a uniform rod of length L, horizontally in such a way that the boy gets $1/4^{th}$ loads. If the boy is at one end of the rod, the distance of the man from the other end is

a) L/3 b) L/4

c) 2 L/3 d) 3 L/4

5. If momentum of a certain body is increased by 50% then increase in the kinetic energy of the body will be

a) 25% b) 50%

c) 100% d) 125%

6. Two bodies of masses M_A and M_B move is opposite directions with velocities v_A and v_B respectively . After an elastic collision they exchange their velocities , then the ratio M_A/M_B must be

a) 1 b) 2

c) 4 d) 8/9

7. A position dependent force, $F = 7 - 2x + 3x^2$ newton acts on a small body of mass 2 kg and displaces it from x = 0 to x = 5 m. The workdone in joule is

a) 70 b) 270

c) 35 d) 125

8. 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 = 0 b) $x = (a / 2b)^{1/6}$

c) $x = (2a / b)^{1/6}$ d) $x = (11a/5b)^{1/6}$

9. A body of mass m accelerates from rest to v_1 in time t_1 . As a function of time t, the instantaneous power delivered to the body is

a) $\frac{m_1 v_1}{t_1}$ b) $\frac{m v_1^2 t}{t_1}$

c) $\frac{m_1 v_1^2 t}{t_1^2}$ d) $\frac{m v_1 t^2}{t_1}$

10. A car of mass m is driven with acceleration a long a straight level and road against a constant external resistive force R. When the velocity of 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

11. A body 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) $t^{1/2}$
b) $t^{3/4}$
c) $t^{3/2}$
d) t^{2}

12. A running man has half the kinetic energy that a boy half his mass has. The man speeds up by 1 m/s and then has the same kinetic energy as the boy . The original speed of the man is

a) $(1+\sqrt{2})\,m/s$
b) $(2+\sqrt{2})\,m/s$
c) $(3+\sqrt{2})\,m/s$
d) $\sqrt{2}\,m/s$

13. A wind –powered generator converts wind energy into electric energy. Assume that the generator coverts a fixed fraction of the wind energy intercepted by its blades into electric energy . For wind speed v, the electric power output will be proportional to

a) v
b) v^2
c) v^3
d) v^{-1}

ANSWERS

Exercise I

1a	2a	3a	4d	5a	6b	7c	8d	9b	10b
11a	12c	13d	14d	15c					

Exercise II

1d	2c	3b	4b	5d	6a	7d	8c	9c	10c
11c12a							13c		