WORKSHEET 2

CHAPTER 2 – WORK, ENERGY AND POWER

A. Tick (✓) the correct option.

1. In MKS system, the unit of work is
   a. erg. b. Joule. c. Newton. d. kg m^2 s^{-2}.
2. Work done by gravity on a body moving upwards is
   a. positive. b. negative. c. zero. d. none of these.
3. If the displacement is zero, then work done is equal to
   a. zero. b. $F \times S$. c. F/S. d. none of these.
4. The rate of doing work is known as
   a. displacement. b. work done. c. power. d. force.
5. 1 electron volt is equivalent to
   a. 1.6×10^{-19} J b. 1.6×10^{19} J c. 0.16×10^{-19} J d. 1.6 J

B. Fill in the blanks.

1. The unit of energy in CGS system is erg where 1 J is equal to _____
2. Work done is _____ when the displacement is in the direction opposite to the applied force.
3. _____ is said to be done only when the force acting on the body produces motion, in the direction of the force applied.
4. Work done by the frictional force is _____
5. The energy possessed by a body by virtue of its motion is called _____

C. State whether the following statements are true or false.

1. The energy stored in matter is called the chemical energy.
2. Solar cell converts light energy to heat energy.
3. Pendulum has only potential energy when it is on the extreme positions.
4. The sum total energies of all kinds in an isolated system always remains constant.
5. Electric generator converts mechanical energy into heat energy.

D. Match the following.

1. Erg	3.6×10^3 J
2. Watt-hour	3.6×10^6 J
3. Calorie	10^{-7} J
4. Kilowatt-hour	1.6×10^{-19} J
5. Electron volt	4.18 J

Name: ..... Teacher's signature: .....

Class: ..... X ..... Date: .....

E. Answer the following questions.

Very short answer questions

1. What is the relationship between SI and CGS units of work?
2. Define power.

Short answer questions

1. State the work energy theorem.
2. What are the different forms of kinetic energy?

Long answer questions

1. Derive the relationship between kinetic energy and linear momentum.
2. A man drops a 5 kg stone from the top of 10 m ladder. What is its kinetic energy when it reaches the ground? What is its speed just before it hits the ground? (Take g = 9.8 m/s^2)

ANSWERS

WORKSHEET 2

A. Tick (✓) the correct option.

1. d 2. b 3. a 4. c 5. a

B. Fill in the blanks.

1. 10^7 ergs 2. negative 3. Force 4. negative 5. kinetic energy

C. State whether the following statements are true or false.

1. T 2. F 3. T 4. T 5. F

D. Match the following.

1. Erg	10^{-7} J
2. Watt-hour	3.6×10^3 J
3. Calorie	4.18 J
4. Kilowatt-hour	3.6×10^6 J
5. Electron volt	1.6×10^{-19} J

E. Answer the following questions.

Very short answer questions

1. 1 Joule = 10^7 erg
2. The rate of doing work is known as the power.

Short answer questions

1. According to this theorem, the work done by the net force on the body is equal to the change in the kinetic energy of the body.
2. There are following three forms of kinetic energy:
   i. Translational kinetic energy
   ii. Rotational kinetic energy
   iii. Vibrational kinetic energy

Long answer questions

1. Let m = mass of the body
   v = velocity of the body

   ∴ linear momentum of the body,

   $$p = mv \text{ or } v = \frac{p}{m} \quad \text{...(i)}$$

   and kinetic energy of the body $= \frac{1}{2}mv^2$ ...(ii)

Substituting the value of v from equation (i) in equation (ii), we get

$$K = \frac{1}{2}m\left(\frac{p}{m}\right)^2$$

or $$K = \frac{p^2}{2m}$$

2. Mass of stone = 5 kg

Height of the ladder = 10 m

Initial velocity = 0

$$v^2 = u^2 + 2gS$$

$$v^2 = 0 + 2\ (9.8)\ (10)$$

$$v^2 = \frac{196}{\sqrt{196}}$$

$$= 14 \text{ m/s}$$

$$\text{Kinetic energy} = \frac{1}{2}mv^2$$

$$= \frac{1}{2} \times 5 \times 14 \times 14$$

$$= 490 \text{ J}$$