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CLASS IX (2018-19)

ASSIGNMENT

Work and Energy

Q1. Define 1 joule.

Ans. Work done is equal to 1joule if a force of 1newton displaces a body by 1 metre in its own direction.

Q2. What is power?

Ans. Power is defined as rate of doing work.

$$\text{Power} = \text{Work/Time}$$

Q3. Define average power.

Ans. Average power is defined as the ratio of net work done to the total time taken.

Q4. A coolie is walking on a railway platform with a load of 30kg on his head . How much work is done by coolie?

Ans. No work is done by coolie because his displacement is in horizontal direction while he applies force on load in upward direction.

Q5. What is meant by energy?

Ans. Energy is defined as the ability of a body to do work.

Q6. How much work is done by moon revolving around the earth in a circular orbit?

Ans. Work done by the moon is zero because centripetal force acts towards the centre of the orbit and the direction of displacement is tangential to the orbit

Q7. State the law of conservation of energy.

Ans. It states that energy can never be created nor be destroyed, but it can only be converted from one form to another.

Q8. How is energy consumed in a simple pendulum?

Ans. The potential energy gained by pendulum at extreme position is equal to its kinetic energy at mean position during oscillations. Some energy is also converted into heat and eventually the pendulum stops after some time.

Q9. Explain who does the work and in which form of energy when an archer stretches a bow to hit a target.

Ans. Archer does the work and the bow possesses the potential energy which is converted into kinetic energy of the arrow.

Q10. State energy conversion in (1) bulb (2) hydel power station (3) electrochemical cell

Ans. 1. Electrical energy is converted in heat and light energy

2. potential energy of water --> kinetic energy of turbine → electrical energy

3. chemical energy → electrical energy

Q11. State the condition for zero work done.

Ans. 1) no displacement occurs despite applied force

2) displacement in the body is perpendicular to applied force

Q12. How energy related to work done? A person pushes a wall fails to move it . what is work done? Why does he get tired?

Ans. Energy and work are related because energy is nothing but capacity of a body to do work. The person does zero work because there is no displacement in the wall. He gets tired because he has expended energy in the form of muscular contractions, some heat etc.

Q13. Derive a relation between kinetic energy of a body and its momentum.

Ans. Kinetic energy(K.E.)= $\frac{1}{2}mv^2$

$$2K.E.=mv^2$$

$$2m K.E.= (mv)^2$$

$$2m K.E.=P^2$$

$$K.E.=\frac{p^2}{2m}$$

Q14. (a) Relate one horsepower to the SI unit of power

(b) convert 1KWh into joule

Ans. 1 horsepower= 746watt

(b) 1KWh= 3.6×10^6 joule

Q15. What will cause the greater change in kinetic energy –changing its mass or changing its velocity?

Ans. $K.E.=\frac{1}{2}mv^2$

As kinetic energy is directly related to square of velocity so the change in velocity will cause a greater change in kinetic energy.

Q16 Give two examples of each (a) a body having potential energy due to change in its shape (b)A body having potential energy due to its position

Ans. A compressed spring and a stretched rubber

(b) a raised hammer and a block held at a height from ground

Solve the questions:-

- 1) A bag of wheat weighs 49kg. Calculate the height to which it should be raised so that its potential energy is 980joule.(ans-2m)
- 2) A ball of mass 2kg is dropped from a height. What is work done by its weight in two seconds after the ball is dropped?(ans-384.16J)
- 3) A body of mass 2kg is thrown up with a speed of 25 m/sec. Find its maximum potential energy.(ans- 625J)
- 4) An electric bulb of 60W is used for 6hours per day. Calculate the units of energy consumed in one day by the bulb.(ans- 0.35units)
- 5) An object of mass 5kg is dropped from a height of 10m. Find its kinetic energy when it is half way down.(ans- 245J)