# Unit 6: Work and Energy

## Textbook Exercise Questions

**6.1 Encircle the correct answer from the given choices.**

**i. The work done will be zero when the angle between force and distance is: (GRW 2014)**
**(a)** 45° **(b)** 60°
**(c) 90° ✓** **(d)** 180°

**ii. If the direction of motion of the force is perpendicular to the direction of motion of the body, then work done will be:**
**(a)** Maximum **(b)** minimum
**(c) zero ✓** **(d)** none of above

**iii. If the velocity of a body becomes double, then its kinetic energy will:**
**(a)** Remains the same **(b)** becomes double
**(c) becomes four times ✓** **(d)** become half

**iv. The work done in lifting a brick of mass 2 kg through a height of 5 m above the ground will be: (LHR 2014)**
**(a)** 2.5 J **(b)** 10 J
**(c)** 50 J **(d) 100 J ✓**

**v. The kinetic energy of a body of mass 2 kg is 25 J. Its speed is:**
**(a) 5 $ms^{-1}$ ✓** **(b)** 1.5 $ms^{-1}$
**(c)** 12.5 $ms^{-1}$ **(d)** 50 $ms^{-1}$

**vi. Which one of the following converts light energy into electrical energy? (LHR 2014)**
**(a)** Electric bulb **(b)** electrical generator
**(c) photocell ✓** **(d)** electric cell

**vii. When a body is lifted through a height 'h', the work done on it appears in the form of its:**
**(a)** kinetic energy **(b) potential energy ✓**
**(c)** elastic potential energy **(d)** geothermal energy

**viii. The energy stored in coal is: (GRW 2013)**
**(a)** heat energy **(b)** kinetic energy
**(c) chemical energy ✓** **(d)** nuclear energy

**ix. The energy stored in a dam is: (GRW 2015)**
**(a)** electrical energy **(b) potential energy ✓**
**(c)** kinetic energy **(d)** thermal energy

**x. In Einstein's mass-energy equation, c is the (LHR 2015)**
**(a)** speed of sound **(b) speed of light ✓**
**(c)** speed of electron **(d)** speed of Earth

**xi. Rate of doing work is called**
**(a)** energy **(b)** torque
**(c) power ✓** **(d)**momentum

**6.2 Define work. What is its SI unit? (LHR 2014)**

**Ans:** Work is done when force acting on a body displaces it in the direction of a force.

**Unit of work**

In System International, its unit is joule (J).

**Joule**

The amount of Work done will be one joule if a force of one Newton displaces a body through a distance of one meter in the direction of the force.

**6.3 When does a force do work? Explain.**

**Ans:** When force acts on the body and body covers some distance in the direction of force then we said work is done. And this work can be calculated by the formula.

$W = F \times S$

**6.4 Why do we need energy?**

**Ans:** We need energy to do different types of work in our daily life. When we say that body has energy, we mean that it has the ability to do work.

**Examples**

- Energy is required to move.
- Energy is required to stop the moving objects.

**6.5 Define energy; give two types of mechanical energy.**

**Ans:** A body possesses energy if it is capable to do work.

**OR**

Ability of a body to do work is known as energy.

**Types of Mechanical Energy**

Mechanical energy possessed by a body is of two types:

**i)** Kinetic Energy

**ii)** Potential Energy

**6.6 Define K.E. and derive its relation.**

**Ans:** See Q. no.2 Long Question

**6.7 Define potential energy and drive its relation. (LHR 2013)**

**Ans:** See Q. no.3 Long Question

**6.8 Why fossils fuels are called non - renewable form energy? (LHR 2013)**

**Ans:** Fossil fuels took millions of years for their formation and once they are consumed, they cannot be generated again so they are called non-renewable form of energy.

**6.9 Which form of energy is most preferred and why?**

**Ans:** Solar energy is most preferred because it is the ultimate source of energy for life and sunrays do not pollute the environment. It is huge source of energy and if we find a suitable method to use a fraction of the solar energy reaching the Earth, then it would be enough to fulfill our energy requirements.

**6.10 How is energy converted from one form to another? Explain.**

**Ans:** See Q. no.5 Long Question

**6.11 Name the five devices that convert electrical energy into mechanical energy.**

**Ans:**

**(i)** Electric Motor
**(ii)** Electric Fan
**(iii)** Elevator
**(iv)** Drill machine
**(v)** Grinder
**(vi)** Sewing machine

**6.12 Name a device that converts mechanical energy into electrical energy. (LHR 2016)**

**Ans:** Electric Generator is device which is used to convert the mechanical energy into electrical energy.

**6.13 What is meant by efficiency of a system?**

**Ans:** Efficiency of a system is the ratio of required form of energy obtained from a system as output to the total energy given to it as input.

**Example**

Electric motors may be used to pump water, to blow air, to wash clothes, to drill holes, etc. for that they use electric energy. How good a machine is, depends how much output we obtain from it by giving certain input. The ratio of useful output to input energy is very important to judge the working of machine.

**6.14 How can you find the efficiency of a system?**

**Ans:** Efficiency of a system is the ratio of required form of energy obtained from a system as output to the total energy given to it as input.

Mathematically, it can be calculated as:

$$\text{Efficiency} = \frac{\text{Required form of output}}{\text{Total input energy}}$$

Or

$$\% \text{ Efficiency} = \frac{\text{Required form of output}}{\text{Total input energy}} \times 100$$

**6.15 What is meant by the term power? (GRW 2013, LHR 2012, 2016)**

**Ans:** "Rate of doing work with respect to time is called the power."

Thus

$$\text{Power} = \frac{\text{Work}}{\text{time}}$$

If we represent power by 'P', work by 'W' and time by 't', then

$$P = \frac{W}{t}$$

**6.16 Define watt. (LHR 2011, 2014, 2016)**

**Ans:** In System International, the unit of power is watt (W).

**Watt**

If a body does a work of one joule in one second then its power will be one watt.

$1\ W = 1\ Js^{-1}$

**Bigger Units**

$1\ KW = 10^3\ W$
$1\ MW = 10^6\ W$

**Last Updated: September 2020**

Report any mistake at freeilm786@gmail.com