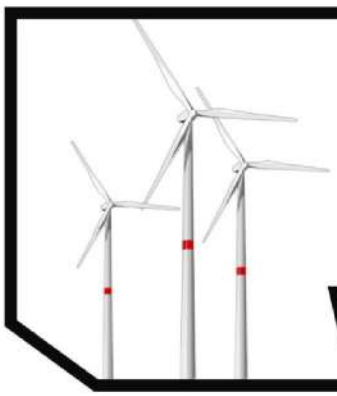

UNIT 6

WORK AND ENERGY

SHORT QUESTIONS

Q.1 Define work and its unit. **(LHR 2011, 2014, GRW 2013, 2015)**

Ans: Definition

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

OR

The product of force and distance covered in the direction of force is equal to the work done.

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."

Q.2 Define Energy and write down its unit. **(LHR 2012, GRW 2013)**

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

OR

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

Quantity

It is a scalar quantity

Unit

Joule is the unit of energy same as that of work.

Types of Energy

Energy exists in various forms such as mechanical energy, heat energy, light energy, sound energy, electrical energy, chemical energy and nuclear energy etc.

Types of Mechanical Energy

Mechanical energy possessed by a body is of two types:

(i) Kinetic Energy

(ii) Potential Energy

Q.3 Define kinetic energy and give at least one example. **(LHR 2014)**

Ans: "The energy possessed by a body due to its motion is called kinetic energy"

Example

- Moving water in a river can carry wooden logs through large distances and can also be used to drive turbines for generating electricity.

Q.4 Define Potential Energy and give examples. **(LHR 2011, 2013, GRW 2014, 2015)**

Ans: The energy possessed by a body due to its position is known as its potential energy.

Examples

- Stored water in dam
- A hammer is raised up to some height has the ability to do work
- A stretched bow has potential energy due to its stretched

Q.5 Define Gravitational Potential Energy and give at least one example. **(GRW 2012)**

Ans: The energy present in a body due to its height is called gravitational potential energy.

Example

- Stored water in dam
- Energy of a stone lying on the roof

Q.6 Define Efficiency. (LHR 2014, GRW 2015)

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.

Q.7 What do you know about Ideal machine?

Ans: An ideal machine is that which gives an output equal to the total energy used by it. In other words, its efficiency is 100 %. People have tried to design a working system that would be 100% efficient. But practically such system does not exist.

Q.8 Can we say that practical systems can be 100% efficient?

Ans: Every system meets energy losses due to friction that causes heat, noise etc. these are not the useful forms of energy and go waste. This means we cannot utilize all the energy given to working system. The energy in the required form obtained from working system always less than the energy given to it as input.

Q.9 Define Power. Write down its unit and define it.

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

Unit of power

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".

Q.10 Do we do any work when we lift a load from the Earth to some height?

Ans: Yes, we do work when we lift a load from the earth to some height because we have to do work against the gravitational pull of the earth. Mathematically, it can be expressed as,

As we know that $W = FS$

As $F = mg$ and $S = h$

So the work done is $W = mgh$

Q.11 How much power is used by a 40 kg athlete by climbing 10m high ladder in 10s?

Ans:

We have Mass = m = 40 kg

Time = t = 10 s

Height = h = S = 10 m

As we know that Force = weight = w = mg = 40 x 10 = 400N

Work = W = FS = 400 x 10 = 4000 J

As we know that Power = P = W/t

So, Power = P = 4000/10 = 400 W

Q.12 Give some examples of energies used in our body?

Ans: There are many kinds of energies are used in our body. Some of them are given below:

Mechanical Energy

For the moving of our body.

Chemical Energy

For making body molecules.

Electrical Energy

For the propagation of electrical signals in the body.

Heat Energy

For maintaining the body temperature.

Q.13 How much work is done when a body moves with uniform velocity?

Ans: When a body moves with uniform velocity means moving with zero acceleration then work done will be zero because according to Newton's second law of motion if a = 0 then the net resultant force acting on the body is zero.

As we know that W = FS
If F = 0 then W = 0 x S = 0