Work and Energy

Solution 1:

Energy: The capacity to do work is called energy. Work done by a machine uses mechanical energy. All the processes of our body such as digestion of food and excretion go on continuously in our body by using energy.

Work: When a force is applied and an object is set in motion or the direction of an object in motion is changed, work is said to be done. To measure work, we need to consider both the force applied as well as the displacement.

Potential energy: The stored up energy which has the potential to do work is called potential energy.

Example: Force is applied to stretch a piece of rubber that displaced it from its position and so work was done on it. Thus, energy was stored in the rubber in its extended condition. This stored energy is used up when the rubber is released and it comes to its original position.

Kinetic energy: The energy which a body gets because of its motion is called kinetic energy.

Example: Moving water turns the blades of a windmill because of kinetic energy.

Solution 2:

A	B
(a) Machine	Mechanical energy
(b) Winding up clockwork	Potential energy
(c) Digestion, excretion	Physical energy
(d) Rolling object	Kinetic energy
(e) Wood	Chemical energy

Solution 3.a:

When force is applied to some object, the object is set in motion and moves from its original place. Thus, the object is displaced.

Solution 3.b:

When a force is applied to an object, it is set in motion or the direction of an object in motion changes. Thus, work is said to be done on applying force.

Solution 3.c:

To measure work, we need to consider both the force applied as well as the displacement.

Solution 3.d:

The different forms of energy are

1. Potential and kinetic energy
2. Chemical energy
3. Heat energy
4. Light energy
5. Sound energy
6. Magnetic energy
7. Electric energy

Solution 3.e:

Heat is a form of energy as work is done by using heat.
Example: In a steam engine, work is done by using heat to change water into steam.

Solution 4:

(a) No work is done unless there is displacement.
(b) If the force applied is the same, then more work is done if more displacement takes place.
(c) Muscles are used to do physical work.
(d) Living things get energy from food.
(e) Food is stored in plants in the form of chemical energy.

Solution 5:

No.	Action	Form of stored energy	Form of energy into which it is converted
1.	Wood is burnt.	Chemical energy	Heat and light energy
2.	Crackers are fired.	Chemical energy	Heat, light and sound energy
3.	A wound up spring is released.	Potential energy	Kinetic energy
4.	Falling water is used for generating electricity.	Kinetic energy	Electric energy

Solution 6.a:

Magnetic energy: Magnetic energy is a form of energy obtained through magnets. Like poles repel each other, while unlike (opposite) poles attract and the forces of attraction or repulsion are due to magnetic energy. Magnetic force can be used to do work. Big machines have been designed which make use of this force. Magnetic cranes are used to lift heavy loads. A magnetic belt is used to separate iron from other scrap.

Solution 6.b:

Generation of electrical energy:

1. Water falling from a great height is used for generating electricity in hydroelectric power plants.
2. A windmill harnesses wind to generate electricity.
3. Electricity can also be generated using sea waves.
4. Electricity can also be generated using nuclear energy.

Uses of electrical energy:

Electrical energy is used in several gadgets such as fan, fridge, washing machine, water heater etc.

Solution 6.c:

Gobar gas production: Gobar gas or biogas is produced by using animal waste such as cow dung and plant refuse. In a gobar gas plant, microorganisms are made to act upon animal dung which produces methane or gobar gas.

Uses of gobar gas:

1. It is used as a fuel for cooking at home in villages.
2. It can be used to produce electricity.
3. Manure is produced while producing gobar gas.

Solution 7:

1. Non-conventional sources of energy: Solar energy, biogas, flowing water, wind energy
2. Fuels: Coal, diesel, petrol
3. Hydroelectric power plant: Hydroelectric power project located at Koyna dam in Maharashtra
4. Renewable sources of energy: Animal dung, plant refuse
5. Never-ending sources of energy: Solar energy, wind energy
6. Machines which work on solar energy: Solar cooker, solar electric cell

Solution 8.a:

When fireworks go off, they give out heat, light and sound energy simultaneously. Substances in the fireworks are packed with chemical energy, so light, heat and sound are all released as soon as they are fired or hit.

Solution 8.b:

The deposits of fuels inside the Earth are limited. As their use is increasing day by day, there is a danger that they will run out. So, it is necessary to use fuels with thrift.