SUBJECT -- PHYSICS
CLASS -- VIII
CHAPTER—4   ENERGY

Q.1 CHOOSE THE CORRECT ANSWER

1.	The SI unit of work is
	a. Newton
	b. Joule
	c. kg-m
	d. none of these
2.	Two bodies A and B moving with the same velocity have their masses in the ratio of 1:4 . What will be the ratio of their kinetic energy?
	a. 2:1
	b. 1:2
	c. 1:4
	d. 4:1
3.	A device that converts electric energy into heat energy
	a. Photocell
	b. Electric heater
	c. Thermocouple
	d. Electric fan
4.	The work is said to be done when force is applied on the body and
	a. The body moves in the direction opposite to the force
	b. The body moves in the direction of the force
	c. The body does not move from its initial position
	d. None of the above
5.	A compressed spring throws up a ball when released. The compressed spring possess
	a. Kinetic energy
	b. Wind energy
	c. Potential energy
	d. Chemical energy
6.	Kinetic energy of a body becomes zero when
	a. Mass of the body increases
	b. Velocity of the body decreases
	c. There is gain in velocity and mass
	d. The body comes to rest
7.	Joule is the SI unit of
	a. Power
	b. Work and power
	c. Work and energy
	d. Energy and power
8.	In photosynthesis light energy is converted into

	a. Heat energy
	b. Chemical energy
	c. Mechanical energy
	d. Electrical energy
9.	Which of the following converts' electrical energy to sound energy?
	a. Electric heater
	b. Microphone
	c. Cell
	d. Loudspeaker
10.	In an oscillating pendulum the energy at its extreme point
	a. Zero
	b. kinetic energy only
	c. potential energy only
	d. both kinetic and potential energy

Q.2 FILL IN THE BLANKS:

1. The SI unit of energy is joule.
2. The kinetic energy of a body is by virtue of its motion.
3. On charging a battery electric energy is converted into chemical energy.
4. Strong wind can turn the blades of a windmill because it possesses kinetic energy.
5. Nuclear energy is obtained by splitting the nucleus of an atom of an element like uranium.
6. Coal and petroleum have chemical energy stored in it.
7. An electric heater converts electric energy into heat energy.
8. Sun is the ultimate source of energy.
9. If the mass of a body is halved, its potential energy will be halved.
10. A microphone converts sound energy into electrical energy.

Q.3 WRITE TRUE OR FALSE :.

1. A flying bird has only kinetic energy. (FALSE)
2. A man is doing work when he is pushing a rigid wall with great force .(FALSE)
3. A water geyser converts electric energy into heat energy . (TRUE)
4. The food that we take in gets converted to muscular energy. (TRUE)
5. The energy from the sun is due to nuclear reaction. (TRUE)
6. The chemical energy gets converted to only light energy during the bursting of crackers.(FALSE)
7. The unit of measurement of work and energy are different. (FALSE)
8. When a ball is thrown up the kinetic energy gets converted to potential energy. (TRUE)
9. Power of a body is the product of work and time. (FALSE)
10. The unit of work is newton. (FALSE)

Q.4 WITH PROPER REASONING CHOOSE THE ODD ONE OUT.

1. A bird on a tree
   Reason:-This is because it is an example of potential energy whereas other three are examples of kinetic energy.

2. Watt
   Reason ;- It is the unit of power while others are unit of energy.
3. Photocell
   Reason :- In this device light energy is converted into electrical energy whereas in other three appliances electrical energy is converted into other forms of energy.
4. Microphone
   Reason :- In this device sound energy is converted to electrical energy. In other three cases chemical energy is converted to other forms of energy.

Q.5 MATCH THE FOLLOWING :   (DIRECT ANSWER)

COLUMN A		COLUMN B	
1	Electrical energy to chemical energy	*	Charging a battery
2	Electromagnet	*	Electrical to magnetic energy
3	Rate of doing work	*	Power
4	Large unit of energy	*	Kilowatt hour
5	Joules per second	*	Watt
6	Photocell	*	Light energy to electrical energy
7	Thermocouple	*	Heat energy to electric energy
8	Electrical	*	A grinder mixer

Q.6 ANSWER THE FOLLOWING QUESTIONS:

1) What is the amount of work done by a man pushing a rigid wall with a force of 200 N ?
Ans. As the displacement is zero , hence the work done is also zero.

2) Define SI unit of work.
Ans. When the point of application of a force of 1 N is displaced through a distance of 1 m in the direction of the force, then the work done is called one joule.

3) State two factors that determine the work done by a body.
Ans. The amount of work done depends upon :
   (i)   The magnitude of the force that is applied on an object.
   (ii)   The distance the object moves along the direction of the force.
4) Distinguish between energy and power.
Ans.

ENERGY		POWER	
1	Energy of the body is the capacity to do work.	1	Power is the rate of doing work.
2	Energy is independent of time.	2	Power depends on time.
3	SI unit of energy is joule (J).	3	SI unit of power is watt (W).

5) Name three sources of heat energy.

Ans. (i) nuclear energy (ii) Fossil fuels   (iii) Biomass   are the three sources of heat energy.

6) Give examples of the following transformation of energy.

(i)Electrical to light energy
Ans. Tubes , bulbs etc.

(ii)Light to electrical energy
Ans. Photocell

(iii)Chemical to heat and light energy
Ans. Fireworks, burning of fossil fuels

(iv)Wind to mechanical energy
Ans. Windmill

(v)Chemical to mechanical energy
Ans. Automobiles, Physical exercise.

7) Write the mathematical expression used to measure for the following

(i)Kinetic energy
Ans. $KE = \frac{1}{2}$ x mass x (velocity)²

$$KE = = \frac{1}{2} mv²$$

(ii)Work
Ans. Work = Force x displacement

$$W = F \times s$$

(iii)Power
Ans. Power (P) $= \frac{work\ done}{Time\ taken}$

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

(iv)Potential energy
Ans. PE = mgh   where m = mass of the body
                              h = height raised
                              g = acceleration due to gravity

8) What is Biomass?
Ans. Biomass is the organic materials (dead leaves, cow dung etc.)From plants and animals.

9) How are work and energy related to each other?

Ans. Energy of a body is measured by the amount of work that the body can do. It can displace a body and exert force. Hence both energy and work are related.

Q. 7 GIVE REASONS FOR THE FOLLOWING

1) A person holding a suitcase does not do any work.
Ans. As the displacement of the suitcase is zero, hence no work is done.

2) An aeroplane flying, has both kinetic and potential energy.
Ans. Because of its speed it possesses kinetic energy and because of its altitude it possesses potential energy. Hence it has both kinetic and potential energy.

3) The bob of an oscillating pendulum has zero potential energy at its mean position.
Ans. If we measure potential energy with reference to the mean position, then at the mean position its vertical height is zero, so it will have zero potential energy at this position.

4) Two balls A and B of 250 g and 500 g when thrown may have the same kinetic energy.
Ans. Because the mass of object B is double the mass of A. Therefore , the kinetic energy of the substance would be same if the velocity of object A will be 2 times the velocity of B .

5) Two girls doing the same amount of work within the same time have the same power.
Ans. As we know Power (P) $= \dfrac{work\ done}{Time\ taken}$, both work done and time taken by the two girls are same, so they have same power.

Q. 8 NUMERICALS

1) How much work is done in raising a stone of mass 5 kg to a height of 5 m? (g =10 m/s²)

Solution:-
         Given That:

        Mass (m) =5 kg
        Height (h) = 5 m
                 g   = 10 m/s²

    ∴ Work done = mgh
                 =5 x 5 x 10
                 =250 J
    Statement :- Work done is 250 J.

2) A force of 25 N acts on a body of mass 5 kg and produces a displacement of 5 m in its own direction. Calculate the amount of work done.

Solution:-

Given that:

$$\text{Force (F)} = 25 \text{ N}$$
$$\text{Displacement (s)} = 5 \text{ m}$$

$$\therefore \text{Work} = \text{F x s}$$
$$= 25 \text{ x } 5$$
$$= 125 \text{ J}$$

Statement:- The amount of work done is 125 J.

3) Mr. Singh of mass 70 kg climbs up a flight of 20 steps each 20 cm high in 1 minute. Calculate (i) the work done by him (ii) the energy spent (iii) the power developed.

Solution:-

Given that :-

$$\text{Mass (m)} = 70 \text{ kg}$$
$$\text{Height raised (h)} = \text{Number of steps x height of each step}$$
$$= 20 \text{ x } 20 \text{ cm}$$
$$= 400 \text{ cm}$$
$$= 4 \text{ m}$$
$$\text{Time taken (t)} = 1 \text{ minute} = 60 \text{ s}$$
$$g = 10 \text{ m/s}^2$$

(i)   Work done = mgh
$$= 70 \text{ x } 10 \text{ x } 4$$
$$= 2800 \text{ J}$$

(ii)   Energy spent = work done
$$= 2800 \text{ J}$$

(iii)   Power developed $= \dfrac{work\ done}{Time\ taken}$

$$= \dfrac{2800}{60}$$

$$= 46.67 \text{ W}$$

4) A vehicle of mass 300 kg is moving with a velocity of 27 km/h. It then increases its velocity to 36 km/h. Calculate (i) the initial kinetic energy (ii) the gain in kinetic energy.

Solution :-

Given that :-

Mass (m) = 300 kg

Initial velocity (V_1) = 27 km/h = 27 x $\frac{5}{18}$ = $\frac{15}{2}$ m/s

Final velocity (V_2) = 36 km/h = 36 x $\frac{5}{18}$ = 10 m/s

(i)   Initial kinetic energy = $\frac{1}{2}$ mv²

$$= \frac{1}{2} \text{ x } 300 \text{ x } \left(\frac{15}{2}\right)^2$$

$$= 8437.5 \text{ J}$$

(ii)   Final kinetic energy = $\frac{1}{2}$ mg²

$$= \frac{1}{2} \text{ x } 300 \text{ x } (10)^2$$

$$= 150 \text{ x } 100$$

$$= 15000 \text{ J}$$

∴ Gain in Kinetic energy = (15000 – 8437.5)

$$= 6562.5 \text{ J}$$

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