SHORT QUESTIONS

Write short answers of the following questions.

1. A bucket is taken to the bottom of a well, does the bucket possess any P.E Explain?

Ans. Since the potential energy is given by;

$$P.E = m\,g\,h$$

Taking the earth's surface as reference, some work is done in taking the bucket is below the earth surface therefore the bucket possess negative P.E the with respect to the surface of the earth.

2. When an arrow is shot from its bow, it has K.E. From where does it get the K.E?

Ans. When an arrow is taken in to the cord (string) of the bow, it is stretched i.e. work is done upon it against the elastic force of the cord in outward direction. This work done must be stored in the cord in the form of elastic P.E. Hence on shooting or releasing the arrow the elastic P.E of the cord is transferred to the arrow in the form of KE with which arrow moves towards the target.

3. Does a hydrogen filled balloon possess any P.E? Explain?

Ans. When a balloon is filled with hydrogen (a gas lighter than air), the gas particles will exert pressure on the walls of the balloon. Hence work must be done by the hydrogen gas against the elastic force of the balloon walls, which will store in it in the form of elastic P.E.

When a hydrogen-filled balloon rises in air some work is done in displacing volume of the air and rising up in the air. This work done is provided by P.E stored in the balloon. Thus the hydrogen filled balloon must possess some P.E.

4. Is K.E a vector quantity?

Ans. No. We know that expression for kinetic energy is;

$$K.E = \tfrac{1}{2}\, m\, \vec{V}.\vec{V}$$

So it is clear from the above equation that K.E involves a scalar product of velocity vector with itself, hence it is a scalar quantity. Also K.E is defined as the energy possessed by a body by virtue of its motion and since energy is a scalar quantity, therefore K.E is also a scalar quantity.

5. What happens to K.E of a bullet when it penetrates into a target?

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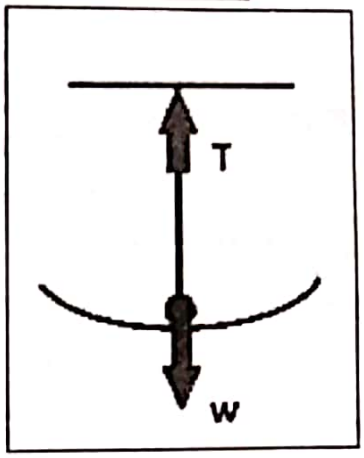
Ans. When a bullet penetrates into the target, the KE of bullet is mostly converted into internal energy of the target. Hence the total internal energy of the target must be increased by an amount equal to KE lost by the bullet. But some energy must be converted in to sound and heat because of the work done by the bullet against the frictional or resistive forces.

6. Does the tension in the string of a swinging pendulum do any work? Explain.

Ans. We know that work is only said to be done when a body covers some displacement along the direction of the force. Since the tension in a string is acting upward and displacement along the direction perpendicular to the force of tension in the string, therefore;



$$W = F\,S\,\text{Cos}\,90^\circ$$
$$W = F\,S\,(0)$$
$$W = 0$$

7. A meteor when enters into the earth's atmosphere burns. What happens to its energy?

Ans. A meteor when enters from space in to the dense atmosphere of the earth with very high speed, then due to very large frictional forces of the air and other particles it catches fire and burns. The energy of the meteor is mainly transformed into heat, light and also to produce some sound, just in accordance with the law of conservation of energy.

8. What type of energy is stored in the spring of watch?

Ans. When winding a watch work is said to be done on the spring against the elastic force of the spring. This work is stored in the form of elastic P.E of the spring or watch.

9. A man drops a cup from a certain height, which breaks into pieces. What energy changes are involved?

Ans. When the man hold the cup at height (h) the cup has P.E (mgh). As the cup is dropped, the P.E will transform into the K.E of the cup. On striking the ground due to reaction of ground the cup will break into pieces. The K.E of the cup at the time of breaking may convert into sound, heat and mainly in dispersing the pieces of the cup in random directions. Also some part of energy is transferred to striking point of the ground.

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10. A man rowing a boat upstream is at rest with respect to shore, is he doing work?

Ans. Since the man is rowing a boat upstream is at rest with respect to shore therefore no displacement is covered.

Mathematically;

$$W = F\,S\,\text{Cos}\,\theta$$

$$W = F\,(0)\,\text{Cos}\,\theta$$

$$W = 0$$

Hence no work is said to be done by the person with respect to shore.

11. Why energy savers are used instead of normal bulbs?

Ans. The efficiency of ordinary light bulb is very low due to its high resistance i.e., about 2 %. This means that in ordinary light bulbs the conversion of electrical energy in to useful form of energy (light) is only 2% and into heat energy is about 98%.

In energy savers due to low resistance, the production of heat is very small. Energy-saving or halogen light bulbs are about 25% more efficient and can last up to three times longer than traditional incandescent bulbs. Therefore maximum part of energy can be saved from wastage. Hence energy savers are used instead of normal bulbs to save power or energy.

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