

## Chapter End Test

Date : _____ Duration: 1:00 Hr Max. Marks : 40	<b>Science</b> Topic : Work and Energy	<b>BATCH</b> IX
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1. Which one of the following does not possess the ability to do work not because of motion?
- A sparrow flying in the sky
  - A sparrow moving slowly on the ground
  - A sparrow in the nest on the tree
  - A squirrel going up the tree

Ans. (b)

2. Water stored in dam possesses:

- |                    |                       |
|--------------------|-----------------------|
| (a) No energy      | (b) Electrical energy |
| (c) Kinetic energy | (d) Potential energy  |

Ans. (d)

3. A girl weighing 400 N climbs a vertical ladder. If the value of  $g$  be  $10 \text{ ms}^{-2}$  the work done by her after climbing 2m will be:

- |            |            |
|------------|------------|
| (a) 200 J  | (b) 800 J  |
| (c) 8000 J | (d) 2000 J |

Ans. (b)

4. The work done on an object does not depend on the:

- |                   |                                          |
|-------------------|------------------------------------------|
| (a) Displacement  | (b) Angle between force and displacement |
| (c) Force applied | (d) Initial velocity of the object       |

Ans. (d)

5. The momentum of a bullet of mass 20g fired from a gun is 10 kg m/s. the kinetic energy of this bullet in kJ will be:

- |         |         |
|---------|---------|
| (a) 5   | (b) 1.5 |
| (c) 2.5 | (d) 25  |

Ans. (c)

6. In case of negative work done the angle between force and displacement is

- |                |                 |
|----------------|-----------------|
| (a) $0^\circ$  | (b) $45^\circ$  |
| (c) $90^\circ$ | (d) $180^\circ$ |

Ans. (d)

7. An iron sphere of mass 10 kg has the same diameter as an aluminium sphere of mass 3.5 kg. Both the spheres are dropped simultaneously from a tower. When they are 10 m above the ground, they will have same:

- |                      |                    |
|----------------------|--------------------|
| (a) Acceleration     | (b) Momentum       |
| (c) Potential energy | (d) Kinetic energy |

Ans. (a)

8. When an object falls from a height towards the earth then its total energy:

- |                      |                                    |
|----------------------|------------------------------------|
| (a) Increases        | (b) Decreases                      |
| (c) Remains constant | (d) First increases then decreases |

Ans. (c)

9. Which of the following statement about the power are not true:

- (a) Hydroelectric power station use water to drive turbines
- (b) In a power station, turbines drive power station
- (c) Electricity from thermal power stations differ from that produced in hydroelectric power stations
- (d) In hydroelectric power stations and thermal power stations, alternators produce electricity

Ans. (c)

10. How much energy does a 100 W electric bulb transfer in 1 minute?

- (a) 100 J
- (b) 600 J
- (c) 3600 J
- (d) 6000 J

Ans. (d)

11. A microphone converts:

- (a) Electrical into sound energy in ordinary telephone
- (b) Microwave energy into sound energy in a mobile phone
- (c) Sound energy into mechanical energy in a stereo system
- (d) Sound energy into electrical energy in public address system

Ans. (d)

12. Which one of the following is not the unit of energy?

- (a) Joule
- (b) Newton meter
- (c) Kilowatt
- (d) Kilowatt hour

Ans. (c)

13. A body is falling from a height  $h$ . After it has fallen a height  $h/2$ , it will possess

- (a) only potential energy
- (b) only kinetic energy
- (c) half potential and half kinetic energy
- (d) more kinetic and less potential energy

Ans. (c)

14. A car is accelerated on a levelled road and attains a velocity 4 times of its initial velocity. In this process the potential energy of the car

- (a) does not change
- (b) becomes twice to that of initial
- (c) becomes 4 times that of initial
- (d) becomes 16 times that of initial

Ans. (a)

15. A stone is thrown upwards. When it reaches the highest position which one of the following has the greatest value?

- (a) Acceleration
- (b) Kinetic energy
- (c) Potential energy
- (d) Weight

Ans. (c)

16. A rocket is moving up with a velocity  $v$ . If the velocity of this rocket is suddenly tripled, what will be the ratio of two kinetic energies?

Ans. Initial velocity =  $v$ ,

then  $v' = 3v$

Initial kinetic energy =  $\frac{1}{2}mv^2$

Final kinetic energy (K.E.) =  $\frac{1}{2}m(v')^2 = \frac{1}{2}m(3v)^2 = 9(\frac{1}{2}mv^2)$

Initial KE : final KE = 1:9

17. Define average power. [1]

Ans. Average power is the ratio between the total work or energy consumed to the total time by the machine or person.

18. An electric heater is rated 1300 W. How much energy does it use in 9.5 hours? [1]

Ans. Energy consumed by an electric heater can be obtained with the help of the expression

$$P = W/t$$

$$P = 1300 \text{ W} = 1.3 \text{ kW}$$

Time for which the heater has operated,

$$t = 9.5 \text{ h}$$

Work done = Energy consumed by the heater

Therefore, energy consumed = Power  $\times$  Time

$$= 1.3 \times 9.5 = 12.35 \text{ kWh}$$

Hence, the energy consumed by the heater in 9.5 h is 12.35 kWh or 12.35 units.

19. A ball is dropped from a height of 12 m. If the energy of the ball reduces by 40% after striking the ground, how much high can the ball bounce back? ( $g = 10 \text{ m s}^{-2}$ ) [2]

Ans. Potential Energy =  $m g h$

$$= m \times 10 \times 12$$

$$= 120 m \text{ J}$$

Energy is reduced by 40% then the remaining energy is 58 m J.

Let the new height to which it will bounce back be 'h'

Therefore,

$$58 m = m \times 10 \times h'$$

$$h' = 6 \text{ m}$$

20. (a) Derive the relation between commercial unit of energy (kWh) and SI unit of energy (joule).  
 (b) A battery lights a bulb. Describe the energy changes involved in the process. [2]

Ans. (a) Relation between commercial unit of energy and SI unit of energy:

$$1 \text{ kilowatt hour} = 1000 \text{ watts for 1 hour}$$

But

$$1 \text{ watt} = 1 \text{ joule} / 1 \text{ second}$$

$$1 \text{ kilowatt hour} = 1000 \text{ joule} / \text{second for 1 hour}$$

$$1 \text{ kilowatt hour} = 1000 \text{ joule} / \text{second} * 60 * 60 \text{ Seconds}$$

$$1 \text{ kilowatt hour} = 3.6 \times 10^6 \text{ joules}$$

- (b) When a bulb is connected to a battery, then the chemical energy of the battery is transferred into electrical energy. When the bulb receives this electrical energy, then it converts it into light and heat energy. Hence, the transformation of energy in the given situation can be shown as:

Chemical energy  $\rightarrow$  electrical energy  $\rightarrow$  light energy + Heat energy.

21. (a) A boy weighing 40 kg carries a box weighing 20 kg to the top of a building 15 m high in 25 seconds. Calculate the power. [1]  
 (b) Define kinetic energy and deduce the relation for the same. [2]

Ans. (a) Total mass = 40 kg + 20 kg

$$\text{Height} = 15 \text{ m}$$

$$\text{Time} = 25 \text{ sec}$$

$$\text{Power} = ?$$

$$\text{Power} = \text{work done} / \text{time taken}$$

$$W = mgh$$

$$P = (m \times g \times h) / t$$

$$P = (60 \times 10 \times 15) / 25$$

$$P = 360 \text{ W}$$

- (b) Kinetic energy is the energy possessed by an object due to its motion. The kinetic energy of an object increases with its speed.

The relation connecting the initial velocity ( $u$ ) and final velocity ( $v$ ) of an object moving with a uniform acceleration  $a$ , and the displacement,  $s$  is

$$v^2 - u^2 = 2a s$$

This gives,

$$s = (v^2 - u^2) / 2a$$

Also,  $F = ma \rightarrow W = ma s$

Therefore,

$$W = ma (v^2 - u^2) / 2a$$

$$W = m (v^2 - u^2) / 2$$

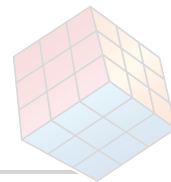
If  $u = 0$ ,

$$W = \frac{1}{2} m v^2$$

$$KE = \frac{1}{2} m v^2$$



**STUDY**  
*mate*



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