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CH 05

CLASS 9 — PHYSICS • SOLVED MCQS

Work and Energy

Ch. 05 MCQ Bank

Every question ticked, highlighted & explained

71+	10	100%
MCQS SOLVED	TOPIC SECTIONS	EXPLAINED

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71 Questions

1 QUESTION 1 OF 71

According to physics, work is said to be done when a force:

A Acts on a body but produces no motion

B Acts on a body and moves it through some distance ✓

C Is balanced by an equal and opposite force

D Acts on a completely stationary wall

CORRECT ANSWER **B. Acts on a body and moves it through some distance**

💡 **EXPLANATION**

Work is defined as the product of the magnitude of force and the distance covered in the direction of force. Work is done only when the force actually causes a displacement.

2 QUESTION 2 OF 71

A man holds a bag of bricks steadily on his head and stands still. In the physics sense, he is:

A Doing maximum work

B Doing work equal to his weight × height

C Doing no work, because there is no displacement ✓

D Doing negative work

CORRECT ANSWER **C. Doing no work, because there is no displacement**

💡 EXPLANATION

Even though he exerts a force to support the load, since there is no displacement, $W = F \times S = F \times 0 = 0$.

3 QUESTION 3 OF 71

The mathematical formula for the work done by a constant force is:

A $W = F / S$

B $W = F \times S$ ✓

C $W = F + S$

D $W = S / F$

CORRECT ANSWER **B. $W = F \times S$**

💡 **EXPLANATION**

Work = Magnitude of force × Distance covered in the direction of force, i.e. $W = F \times S$ (Eq. 5.1).

4 QUESTION 4 OF 71

A man pushes hard against a wall, but the wall does not move at all. The work done by the man on the wall is:

A Maximum

B Zero ✓

C Negative

D Equal to the applied force

CORRECT ANSWER **B. Zero**

💡 EXPLANATION

Since the displacement $S = 0$, $W = F \times S = 0$, no matter how large the applied force is.

5 QUESTION 5 OF 71

If a body moves with uniform velocity so that the net force acting on it is zero, the work done by the net force is:

A Positive

B Negative

C Zero ✓

D Infinite

CORRECT ANSWER **C. Zero**

💡 EXPLANATION

From $W = F \times S$, if $F = 0$ then $W = 0 \times S = 0$, regardless of the distance the body covers.

6 QUESTION 6 OF 71

Work is a _____ quantity.

A Vector

B Scalar ✓

C Tensor

D Complex

CORRECT ANSWER B. Scalar

💡 **EXPLANATION**

Work does not convey any directional information, so like energy, it is treated as a scalar quantity.

7 QUESTION 7 OF 71

A girl sits at her desk studying for hours. According to the physics definition of work (not the everyday meaning), she:

A Is always doing a large amount of work because she is thinking hard

B May be doing little or no physical work if no force is producing displacement ✓

C Is doing negative work

D Cannot be analysed using the concept of work at all

CORRECT ANSWER **B. May be doing little or no physical work if no force is producing displacement**

💡 **EXPLANATION**

The everyday meaning of ‘work’ (any mental or physical activity) differs from the physics definition, which strictly requires a force causing a displacement.

8 QUESTION 8 OF 71

The two essential elements needed for work to be done on a body are:

A Force and time

B Force and distance ✓

C Mass and velocity

D Energy and power

CORRECT ANSWER **B. Force and distance**

💡 **EXPLANATION**

As the chapter states, “Force and distance are two essential elements of work.” Without displacement in the direction of the force, no work is done.

9 QUESTION 9 OF 71

(Example 5.1) A person does 200 J of work pushing a carton through a distance of 5 m. The force applied by him is:

A 20 N

B 40 N ✓

C 1000 N

D 0.025 N

CORRECT ANSWER **B. 40 N**

💡 EXPLANATION

Using W = F × S, F = W / S = 200 J / 5 m = 40 N.

10 QUESTION 10 OF 71

A man carries bricks balanced on his head and walks along a level, horizontal road. In the physics sense, the work done in carrying (not lifting) the bricks horizontally is:

A Large, because a big force is being exerted

B Zero, since the supporting force is vertical while the displacement is horizontal ✓

C Equal to his weight multiplied by the distance walked

D Negative

CORRECT ANSWER **B. Zero, since the supporting force is vertical while the displacement is horizontal**

💡 EXPLANATION

Just like carrying a bag in Fig. 5.6, the applied force (upward, to support the weight) is perpendicular to the horizontal displacement, so $\cos\theta = \cos 90° = 0$ and $W = 0$.

11 QUESTION 11 OF 71

If a force F acts on a body at an angle θ to the direction of motion, the work done is given by:

A $W = F \times S$

B $W = FS \sin\theta$

C $W = FS \cos\theta$ ✓

D $W = FS \tan\theta$

CORRECT ANSWER **C. $W = FS \cos\theta$**

💡 **EXPLANATION**

Only the component of the force along the direction of motion, $F \cos\theta$, contributes to the work done, giving $W = (F \cos\theta)\, S = FS \cos\theta$ (Eq. 5.2).

12 QUESTION 12 OF 71

When θ = 0°, i.e. the force and displacement are in the same direction, the work-at-an-angle formula reduces to:

A $W = 0$

B $W = FS$ ✓

C $W = FS / 2$

D $W = F^2S$

CORRECT ANSWER **B. W = FS**

💡 EXPLANATION

Since cos0° = 1, W = FS(1) = FS, matching the basic work formula.

13 QUESTION 13 OF 71

When the angle θ between the applied force and the displacement is 90°, the work done by that force is:

A Maximum

B Zero ✓

C Equal to FS

D Negative

CORRECT ANSWER **B. Zero**

💡 EXPLANATION

Since cos90° = 0, W = FS(0) = 0. This is the case when the force is perpendicular to the displacement, as when carrying a bag horizontally.

14 QUESTION 14 OF 71

(Example 5.2) A 65 N force pulls a suitcase through a distance of 20 m at an angle of 30° to the direction of motion (cos30° = 0.866). The work done is:

A 1300 J

B 1125.8 J ✓

C 650 J

D 563 J

CORRECT ANSWER **B. 1125.8 J**

💡 EXPLANATION

$W = FS\cos\theta = 65\ N \times 20\ m \times 0.866 = 1125.8\ J$.

15 QUESTION 15 OF 71

On a force–distance graph for a constant force, the work done is represented by:

A The slope of the line

B The area under the force-distance curve ✓

C The y-intercept of the graph

D The x-intercept of the graph

CORRECT ANSWER B. The area under the force-distance curve

💡 EXPLANATION

The shaded rectangular area under the F-S graph equals F × S, which is exactly the work done by the force.

16 QUESTION 16 OF 71

The same force moves an object the same distance, once from north to south and once from east to west. Comparing the two cases, the work done is:

A Different, because direction changes the amount of work

B The same in both cases, since work is a scalar and does not depend on direction ✓

C Greater when moving north to south

D Zero in one of the two cases

CORRECT ANSWER **B. The same in both cases, since work is a scalar and does not depend on direction**

💡 EXPLANATION

Since work does not convey directional information (it is a scalar quantity), equal force and equal distance always give equal work, regardless of the direction of motion.

17 QUESTION 17 OF 71

The SI unit of work is the:

A Newton

B Watt

C Joule ✓

D Pascal

CORRECT ANSWER **C. Joule**

💡 EXPLANATION

The chapter states clearly: “The SI unit of work is joule (J).”

18 QUESTION 18 OF 71

One joule of work is done when:

A A force of 1 N moves a body through 1 m in its own direction ✓

B A force of 10 N moves a body through 1 m

C A force of 1 N moves a body through 10 m

D A force of 1 N moves a body through 1 cm

CORRECT ANSWER **A. A force of 1 N moves a body through 1 m in its own direction**

💡 EXPLANATION

By definition, one joule of work is done when a force of one newton acting on a body moves it through a distance of one metre in its own direction.

19 QUESTION 19 OF 71

1 kJ (kilojoule) is equal to:

A $10\ J$

B $100\ J$

C $10^3\ J$ ✓

D $10^6\ J$

CORRECT ANSWER **C. 10^3 J**

💡 EXPLANATION

The chapter gives $1\ kJ = 10^3\ J$ as a bigger unit of work.

20 QUESTION 20 OF 71

1 MJ (megajoule) is equal to:

A 10^3 J

B 10^6 J ✓

C 10^9 J

D 10^2 J

CORRECT ANSWER **B. 10^6 J**

💡 EXPLANATION

The chapter gives 1 MJ = 10^6 J as a bigger unit of work.

21 QUESTION 21 OF 71

The relation 1 J = 1 N × 1 m shows that the joule can also be written in the derived unit form:

A N / m

B N · m ✓

C N / s

D m / N

CORRECT ANSWER B. N · m

💡 **EXPLANATION**

From W = F × S, with force in newtons and distance in metres, 1 J = 1 N × 1 m = 1 N·m.

22 QUESTION 22 OF 71

Energy can be defined as:

A The force required to move a body

B The ability of a body to do work ✓

C The rate of doing work

D The total distance covered by a body

CORRECT ANSWER **B. The ability of a body to do work**

💡 EXPLANATION

The chapter defines energy as the ability of a body to do work.

23 QUESTION 23 OF 71

Work and energy share the same SI unit because:

A They have identical dimensions but unrelated meanings

B One joule of energy is spent whenever one joule of work is done on a body ✓

C Energy has no properly defined SI unit

D Work and energy are completely unrelated concepts

CORRECT ANSWER **B. One joule of energy is spent whenever one joule of work is done on a body**

💡 EXPLANATION

The chapter states: “When one joule work is done on a body, the amount of energy spent is one joule,” linking the two directly and giving both the unit joule.

24 QUESTION 24 OF 71

Like work, energy is a:

A Vector quantity

B Scalar quantity ✓

C Tensor quantity

D Dimensionless quantity

CORRECT ANSWER **B. Scalar quantity**

💡 EXPLANATION

The chapter explicitly states: “Like work, energy is a scalar quantity.”

25 QUESTION 25 OF 71

The two basic forms of energy identified in the chapter are:

A Electrical and chemical energy

B Kinetic and potential energy ✓

C Heat and light energy

D Nuclear and solar energy

CORRECT ANSWER **B. Kinetic and potential energy**

💡 **EXPLANATION**

The text lists the two basic forms of energy as: (i) Kinetic energy and (ii) Potential energy.

26 QUESTION 26 OF 71

The combination of kinetic and potential energy of a body is called:

A Thermal energy

B Mechanical energy ✓

C Nuclear energy

D Chemical energy

CORRECT ANSWER **B. Mechanical energy**

💡 **EXPLANATION**

The chapter states: “The combination of these two types of energies is called mechanical energy.”

27 QUESTION 27 OF 71

Kinetic energy of a body is the energy it possesses by virtue of its:

A Position

B Motion ✓

C Temperature

D Chemical composition

CORRECT ANSWER **B. Motion**

💡 **EXPLANATION**

Kinetic energy is defined as the energy that a body possesses by virtue of its motion.

28 QUESTION 28 OF 71

The formula for the kinetic energy of a body of mass m moving with velocity v is:

A $E_k = mv$

B $E_k = \frac{1}{2}mv^2$ ✓

C $E_k = mv^2$

D $E_k = 2mv^2$

CORRECT ANSWER B. $E_k = \frac{1}{2}mv^2$

💡 EXPLANATION

Using the work-energy relation and a velocity-time graph, the chapter derives $E_k = \frac{1}{2}mv^2$ (Eq. 5.3).

29 QUESTION 29 OF 71

(Example 5.3) A 3000 kg truck moves with a uniform velocity of 54 km/h (= 15 m/s). Its kinetic energy is:

A 33750 J

B 337500 J ✓

C 45000 J

D 675000 J

CORRECT ANSWER **B. 337500 J**

💡 **EXPLANATION**

$E_k = \frac{1}{2}mv^2 = \frac{1}{2} \times 3000\ kg \times (15\ m/s)^2 = \frac{1}{2} \times 3000 \times 225 = 337500\ J$.

30 QUESTION 30 OF 71

Potential energy is defined as the energy a body possesses by virtue of its:

A Motion

B Position or deformation ✓

C Mass alone

D Temperature

CORRECT ANSWER **B. Position or deformation**

💡 **EXPLANATION**

Potential energy is the energy that a body possesses by virtue of its position or deformation, distinct from kinetic energy which depends on motion.

31 QUESTION 31 OF 71

The energy stored in a compressed or stretched spring is called:

A Gravitational potential energy

B Elastic potential energy ✓

C Chemical potential energy

D Thermal energy

CORRECT ANSWER **B. Elastic potential energy**

💡 **EXPLANATION**

The chapter specifically names the energy stored in a compressed or stretched spring as elastic potential energy.

32 QUESTION 32 OF 71

The potential energy stored in the chemicals of a battery, later converted into electrical energy by chemical reactions, is called:

A Elastic potential energy

B Nuclear potential energy

C Chemical potential energy ✓

D Gravitational potential energy

CORRECT ANSWER **C. Chemical potential energy**

💡 EXPLANATION

The chapter calls this chemical potential energy, which is changed to electrical energy through chemical reactions inside the battery.

33 QUESTION 33 OF 71

The formula for the gravitational potential energy of a body of mass m raised to a height h is:

A $E_p = mgh$ ✓

B $E_p = ½mgh$

C $E_p = mg / h$

D $E_p = mh / g$

CORRECT ANSWER **A. $E_p = mgh$**

💡 **EXPLANATION**

Since $E_p = wh$ and the weight $w = mg$, substituting gives $E_p = mgh$ (Eq. 5.4).

34 QUESTION 34 OF 71

(Example 5.4) A ball of mass 180 g is thrown vertically upward to a height of 12 m (g = 10 m/s²). The potential energy gained by the ball is:

A 2.16 J

B 21.6 J ✓

C 216 J

D 0.216 J

CORRECT ANSWER **B. 21.6 J**

💡 EXPLANATION

$E_p = mgh = 0.18\ kg \times 10\ m/s^2 \times 12\ m = 21.6\ J.$

35 QUESTION 35 OF 71

According to the chapter, a waterfall is the most obvious everyday example of:

A Elastic potential energy

B Gravitational potential energy converting into kinetic energy ✓

C Chemical potential energy

D Nuclear potential energy

CORRECT ANSWER **B. Gravitational potential energy converting into kinetic energy**

💡 EXPLANATION

The text describes a waterfall as the most obvious example of gravitational potential energy: water at the top has potential energy, which converts to kinetic energy as it falls and can run turbines.

36 QUESTION 36 OF 71

The principle of conservation of energy states that:

A Energy can be created but never destroyed

B Energy cannot be created or destroyed; it may transform from one form to another, but the total amount never changes ✓

C Energy is always eventually converted into heat and lost forever

D Only kinetic energy obeys a conservation law

CORRECT ANSWER **B. Energy cannot be created or destroyed; it may transform from one form to another, but the total amount never changes**

💡 EXPLANATION

This is the formal statement given in the chapter: energy cannot be created or destroyed, it can only change form, while the total remains constant.

37 QUESTION 37 OF 71

During an energy transfer process, some energy seems to be 'lost' due to friction of moving parts. This dissipated energy is called:

A Potential energy

B Kinetic energy

C Waste energy ✓

D Elastic energy

CORRECT ANSWER **C. Waste energy**

💡 EXPLANATION

The chapter explains that this heat, dissipated in the environment due to friction, does not remain available for doing useful work and is therefore called waste energy.

38 QUESTION 38 OF 71

A body of mass m is at rest at point A, height h above the ground. Its total mechanical energy at this point equals:

A mgh (entirely potential) ✓

B ½mv² (entirely kinetic)

C Zero

D mg + h

CORRECT ANSWER A. mgh (entirely potential)

💡 EXPLANATION

Since the body is at rest, $E_k = 0$, so its total energy is purely potential: $E = E_p = mgh$.

39 QUESTION 39 OF 71

Just before a body, released from height h, strikes the ground, its potential energy E_p and kinetic energy E_k are:

A $E_p = mgh$, $E_k = 0$

B $E_p = 0$, $E_k = mgh$ ✓

C $E_p = E_k = mgh / 2$

D Both E_p and E_k are zero

CORRECT ANSWER **B. $E_p = 0$, $E_k = mgh$**

💡 **EXPLANATION**

Just before hitting the ground, the entire potential energy has been converted into kinetic energy, so $E_p = 0$ and $E_k = mgh$.

40 QUESTION 40 OF 71

At an intermediate point B, at height x above the ground during a fall from height h, the total mechanical energy E of the body equals:

A $mg(h - x) + mgx = mgh$ ✓

B $mgh - mgx$ only

C mgx only

D $mg(h - x)$ only

CORRECT ANSWER **A. $mg(h - x) + mgx = mgh$**

💡 EXPLANATION

At point B, $E_p = mg(h - x)$ and $E_k = mgx$, so the total energy $E = mg(h - x) + mgx = mgh$, confirming that total energy stays constant throughout the fall.

41 QUESTION 41 OF 71

When a falling body finally strikes the ground, its kinetic energy is ultimately dissipated as:

A Potential energy stored in the ground

B Heat and sound released into the environment ✓

C Chemical energy

D Elastic energy of the ground

CORRECT ANSWER **B. Heat and sound released into the environment**

💡 EXPLANATION

The chapter states that on hitting the ground, this energy is dissipated as heat and sound in the environment.

42 QUESTION 42 OF 71

Fossil fuel energy comes from the burning of:

A Oil, coal, and natural gas ✓

B Only coal

C Uranium and plutonium

D Water and wind

CORRECT ANSWER **A. Oil, coal, and natural gas**

💡 **EXPLANATION**

The chapter identifies oil, coal, and natural gas as the fossil fuels whose burning produces fossil fuel energy.

43 QUESTION 43 OF 71

In fossil-fuel electricity generation, the steam-driven turbine is directly connected to and drives the:

A Condenser

B Generator ✓

C Transformer

D Water reservoir

CORRECT ANSWER **B. Generator**

💡 **EXPLANATION**

As shown in Fig. 5.13, the burning fuel produces steam that runs the turbine, which in turn drives the generator to produce electricity.

44 QUESTION 44 OF 71

Hydroelectric generation works by converting which form of energy into electricity?

A The chemical energy of water

B The gravitational potential energy of stored water, first into kinetic energy, then into electricity ✓

C The nuclear energy of water molecules

D The solar energy absorbed by water

CORRECT ANSWER **B. The gravitational potential energy of stored water, first into kinetic energy, then into electricity**

💡 EXPLANATION

Water held in a high reservoir has gravitational potential energy. As it falls, this converts to kinetic energy, which rotates a turbine connected to a generator.

45 QUESTION 45 OF 71

The large structure with tunnels that lets water flow from a reservoir to a lower level, used in hydroelectric generation, is called a:

A Turbine

B Dam ✓

C Geyser

D Reactor

CORRECT ANSWER **B. Dam**

💡 EXPLANATION

The chapter states: “Such a construction is known as dam,” referring to the reservoir-and-tunnel system for hydroelectric power.

46 QUESTION 46 OF 71

Solar heating panels installed on rooftops usually consist of large metal plates that are:

A Painted white to reflect sunlight

B Painted black to absorb the Sun's heat ✓

C Made entirely of glass

D Coated with silver

CORRECT ANSWER **B. Painted black to absorb the Sun's heat**

💡 **EXPLANATION**

The chapter states that solar heating panels consist of large metal plates painted black so they can effectively absorb heat from the Sun.

47 QUESTION 47 OF 71

Solar cells (also known as photovoltaic cells) work by directly converting sunlight into:

A Heat energy

B Electricity ✓

C Chemical energy

D Wind energy

CORRECT ANSWER **B. Electricity**

💡 **EXPLANATION**

In the second method of using solar energy, sunlight is directly transformed into electricity through the use of solar (photovoltaic) cells.

48 QUESTION 48 OF 71

Since the voltage produced by a single solar cell is very low, practical solar panels are made by:

A Using one very large cell instead of many small ones

B Connecting a large number of cells in series to form a panel ✓

C Cooling the cells to very low temperatures

D Operating the cells only at night

CORRECT ANSWER **B. Connecting a large number of cells in series to form a panel**

💡 EXPLANATION

To obtain sufficient voltage for practical use, a large number of solar cells are connected in series to form a solar cell panel, as shown in Fig. 5.16.

49 QUESTION 49 OF 71

Nuclear power stations generate energy using nuclear fuels such as:

A Coal and oil

B Uranium and plutonium ✓

C Hydrogen and helium

D Natural gas

CORRECT ANSWER **B. Uranium and plutonium**

💡 **EXPLANATION**

The chapter states that nuclear power stations make use of nuclear fuels such as uranium and plutonium, releasing energy through nuclear fission.

50 QUESTION 50 OF 71

According to the chapter, Pakistan's nuclear power stations are located at:

A Lahore and Islamabad

B Karachi and Chashma ✓

C Peshawar and Quetta

D Multan and Faisalabad

CORRECT ANSWER **B. Karachi and Chashma**

💡 **EXPLANATION**

The text explicitly states: “Pakistan also runs nuclear power stations at Karachi and Chashma.”

51 QUESTION 51 OF 71

Geothermal energy is extracted from:

A Ocean tides

B Semi-molten hot rocks deep under the Earth's surface ✓

C Direct sunlight

D Fast-blowing wind currents

CORRECT ANSWER **B. Semi-molten hot rocks deep under the Earth's surface**

💡 EXPLANATION

Geothermal energy comes from hot rocks present in semi-molten form deep under the Earth's surface, heated by the decay of radioactive elements, at temperatures of about 250°C.

52 QUESTION 52 OF 71

Which of the following is a non-renewable source of energy according to the chapter?

A Solar energy

B Wind energy

C Fossil fuels ✓

D Tidal energy

CORRECT ANSWER C. Fossil fuels

💡 EXPLANATION

The chapter classifies fossil fuels (and nuclear energy) as non-renewable, since they took millions of years to form and exist only in limited quantity.

53 QUESTION 53 OF 71

All of the following are renewable sources of energy EXCEPT:

A Hydroelectric energy

B Solar energy

C Wind and tidal energy

D Fossil fuels ✓

CORRECT ANSWER **D. Fossil fuels**

💡 **EXPLANATION**

Hydro, solar, wind, and tidal energy are continuous processes that will not run out; fossil fuels, in contrast, are non-renewable and limited in supply.

54 QUESTION 54 OF 71

Compared with fossil fuel and nuclear power, hydroelectric power production is described in the chapter as:

A More expensive and more polluting

B More economical and pollution free ✓

C Equally polluting as fossil fuels

D Impossible to generate on a large scale

CORRECT ANSWER **B. More economical and pollution free**

💡 **EXPLANATION**

The chapter states: “The production of hydroelectric power is more economical and pollution free.”

55 QUESTION 55 OF 71

A commonly cited disadvantage of wind energy (windmills), as mentioned in the chapter, is that they:

A Release large amounts of toxic gases

B Are very noisy, and some people feel they spoil the beauty of the landscape ✓

C Require nuclear fuel to operate

D Cannot generate any usable electricity

CORRECT ANSWER **B. Are very noisy, and some people feel they spoil the beauty of the landscape**

💡 EXPLANATION

The chapter notes: “Windmills are very noisy. Some people think that wind turbines spoil the beauty of landscape.”

56 QUESTION 56 OF 71

A major danger of nuclear power generation discussed in the chapter is:

A Excessive noise pollution

B Leakage of radioactive radiation, which is harmful to living bodies ✓

C Its complete inability to generate electricity efficiently

D Excessive water consumption with no other risk

CORRECT ANSWER **B. Leakage of radioactive radiation, which is harmful to living bodies**

💡 **EXPLANATION**

The chapter states there is always a danger of radioactive radiation leakage from nuclear plants, which is harmful to living bodies, and that disposal of nuclear waste is another serious problem.

57 QUESTION 57 OF 71

According to the ‘Do You Know?’ fact box, burning fossil fuels releases approximately how much carbon dioxide into the atmosphere every year?

A Five million tonnes

B Five billion tonnes ✓

C Five trillion tonnes

D Five thousand tonnes

CORRECT ANSWER **B. Five billion tonnes**

💡 **EXPLANATION**

The chapter states: “Burning fossil fuels release five billion tonnes of carbon dioxide into the atmosphere every year.”

58 QUESTION 58 OF 71

Power is defined as:

A The total work done by a body

B The time rate of doing work ✓

C The force applied over a certain distance

D The total energy stored in a body

CORRECT ANSWER B. The time rate of doing work

💡 EXPLANATION

The chapter states plainly: “Power is defined as the time rate of doing work.”

59 QUESTION 59 OF 71

The mathematical formula for power, where W is the work done in time t, is:

A $P = W \times t$

B $P = W / t$ ✓

C $P = t / W$

D $P = W + t$

CORRECT ANSWER **B. $P = W / t$**

💡 **EXPLANATION**

By definition of the time rate of doing work, $P = W / t$ (Eq. 5.5).

60 QUESTION 60 OF 71

The SI unit of power is the:

A Joule

B Newton

C Watt ✓

D Horsepower

CORRECT ANSWER **C. Watt**

💡 EXPLANATION

Since both work and time are scalar quantities, power is also scalar, and its SI unit is the watt (W).

61 QUESTION 61 OF 71

One watt is defined as the work done at the rate of:

A One joule per minute

B One joule per second ✓

C One newton per second

D One newton-metre per hour

CORRECT ANSWER B. One joule per second

💡 EXPLANATION

The chapter states: “One watt is the work done at the rate of one joule per second,” i.e. 1 W = 1 J / 1 s.

62 QUESTION 62 OF 71

One horsepower (hp), the British engineering unit of power, is equal to:

A 74.6 W

B 746 W ✓

C 7460 W

D 100 W

CORRECT ANSWER **B. 746 W**

💡 **EXPLANATION**

The chapter states that 1 hp = 746 W, as defined in the British engineering system.

63 QUESTION 63 OF 71

(Example 5.5) A 1000 kg car with an acceleration of 4 m/s² covers a distance of 50 m in 5 seconds. The power generated by its engine is:

A 4 kW

B 40 kW ✓

C 400 kW

D 4000 kW

CORRECT ANSWER **B. 40 kW**

💡 EXPLANATION

F = ma = 1000 × 4 = 4000 N; W = FS = 4000 × 50 = 2.0 × 10^5 J; P = W/t = (2.0 × 10^5)/5 = 4 × 10^4 W = 40 kW.

64 QUESTION 64 OF 71

According to the ‘Do You Know?’ power table in the chapter, which household appliance has the HIGHEST average power rating?

A Bulb

B Tube light

C Air conditioner ✓

D Toaster

CORRECT ANSWER C. Air conditioner

💡 EXPLANATION

In the appliance table, the air conditioner has the highest listed average power at 2500 watts, well above the toaster (1000 W) and other appliances.

65 QUESTION 65 OF 71

The watt, the SI unit of power, is named in honour of:

A Isaac Newton

B James Watt ✓

C James Joule

D Albert Einstein

CORRECT ANSWER **B. James Watt**

💡 EXPLANATION

The chapter notes the watt is named in honour of James Watt (1736–1819), a Scottish engineer who perfected the steam engine.

66 QUESTION 66 OF 71

The efficiency of a working system is defined as the ratio of:

A Input energy to output energy

B Useful output energy to total input energy ✓

C Power to time

D Force to distance

CORRECT ANSWER **B. Useful output energy to total input energy**

💡 **EXPLANATION**

The chapter defines: “The ratio of useful output energy and the total input energy is called the efficiency of a working system.”

67 QUESTION 67 OF 71

Percentage efficiency of a system is calculated using the formula:

A (Useful output energy / Total input energy) × 100 ✓

B (Total input energy / Useful output energy) × 100

C Useful output energy + Total input energy

D (Total input energy − Useful output energy) × 100

CORRECT ANSWER **A. (Useful output energy / Total input energy) × 100**

💡 EXPLANATION

Percentage Efficiency = (Useful output energy / Total input energy) × 100, as given in Eq. 5.6.

68 QUESTION 68 OF 71

A machine whose output energy exactly equals its input energy is called an:

A Ideal machine, with 100% efficiency ✓

B Overloaded machine

C Impossible machine that cannot exist even in theory

D Inefficient machine

CORRECT ANSWER **A. Ideal machine, with 100% efficiency**

💡 **EXPLANATION**

The chapter states: “A machine with its output equal to input is called an ideal machine with efficiency 100%.”

69 QUESTION 69 OF 71

Why can no real machine ever achieve 100% efficiency, according to the chapter?

A Because gravity always directly opposes every motion

B Because some energy is always wasted as heat due to friction, air resistance, etc. ✓

C Because all real machines are too large in size

D Because the SI system of units forbids it

CORRECT ANSWER **B. Because some energy is always wasted as heat due to friction, air resistance, etc.**

💡 EXPLANATION

The chapter explains that energy losses are inevitable in any working machine because some energy is always lost as heat due to friction and air resistance, making a perpetual, 100%-efficient machine impossible.

70 QUESTION 70 OF 71

(Example 5.6) A 120 N block is dragged up a 20 m long slope using a 100 N force, lifting it to a height of 10 m. The percentage efficiency of this system is:

A 50%

B 60% ✓

C 83.3%

D 120%

CORRECT ANSWER **B. 60%**

💡 EXPLANATION

Total input energy = F × S = 100 N × 20 m = 2000 J. Useful output = wh = 120 N × 10 m = 1200 J. Efficiency = (1200/2000) × 100 = 60%.

71 QUESTION 71 OF 71

According to the ‘Do You Know?’ efficiency table in the chapter, which of the following has the LOWEST average efficiency?

A Diesel engine (35%)

B Electric motor (80%)

C Bicycle (15%) ✓

D Petrol engine (25%)

CORRECT ANSWER C. Bicycle (15%)

💡 EXPLANATION

In the average efficiency table, the bicycle has the lowest listed efficiency at 15%, compared to the petrol engine (25%), diesel engine (35%), and electric motor (80%).

Well Done!

You've completed all 71+ solved MCQs from Chapter 05: Work and Energy. Keep practicing consistently — mastery of the fundamentals is what wins marks in the exam.

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