

# AME CET Technical Aptitude

## Sample Paper – 5

Duration: 30 Minutes

Maximum Marks: 120

### Instructions

- This paper contains **30** Multiple Choice Questions (Single Correct Answer), covering **Mechanical & Applied-Physics Aptitude** (Q1–15) and **Electrical, Electronics & Aviation Technical Fundamentals** (Q16–30), in the **AME CET** marking style.
- Each correct answer carries **+4 marks**. Each wrong answer carries **–1 mark**. Unattempted questions carry **0 marks**.
- Only **one** option is correct per question. Choose carefully.
- This is a **supplementary technical-aptitude practice set** for AME CET aspirants; pacing is one minute per question, matching the main exam.
- Use of mobile phones, calculators, or any electronic gadget is strictly prohibited.

### Part A: Mechanical & Applied-Physics Aptitude

**Q1.** The weight of a body of mass 6 kg, taking the acceleration due to gravity as  $g = 10 \text{ m/s}^2$ , is:

- (A) 0.6 N
- (B) 16 N
- (C) 60 N
- (D) 6 N

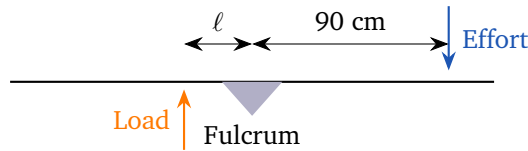
**Q2.** A force of 8 N acts on a body for 3 seconds. The impulse delivered to the body (equal to its change in momentum) is:

- (A) 2.67 N·s



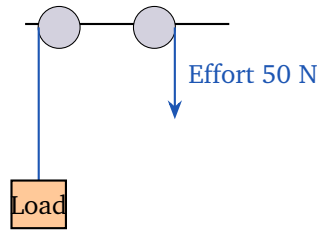
- (B) 11 N·s
- (C) 5 N·s
- (D) 24 N·s

**Q3.** In the class-1 lever shown, the effort arm is 90 cm and the ideal mechanical advantage is 3. The length of the load arm is:



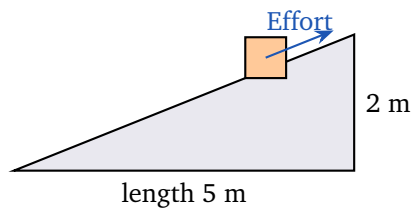
- (A) 93 cm
  - (B) 30 cm
  - (C) 270 cm
  - (D) 87 cm
- Q4.** A spring is stretched by 0.2 m. If the force needed grows uniformly from 0 N to 40 N, the work done in stretching it (using the average force) is:
- (A) 4 J
  - (B) 8 J
  - (C) 40 J
  - (D) 0.5 J
- Q5.** An electric heater of power 1500 W operates for 2 minutes. The energy it consumes is:
- (A) 3000 J
  - (B) 750 J
  - (C) 180000 J
  - (D) 12.5 J
- Q6.** A pulley system (ideal) has a mechanical advantage of 4. If an effort of 50 N is applied, as shown, the maximum load that can be lifted is:





- (A) 12.5 N
- (B) 54 N
- (C) 100 N
- (D) 200 N

**Q7.** A load of weight 300 N is pushed up a smooth (frictionless) inclined plane of length 5 m and vertical height 2 m, as shown. The effort needed (ignoring friction) is:



- (A) 120 N
- (B) 750 N
- (C) 600 N
- (D) 60 N

**Q8.** A wire of cross-sectional area  $2 \times 10^{-4} \text{ m}^2$  carries a tensile stress of  $3 \times 10^7 \text{ Pa}$ . The tensile force acting on the wire is:

- (A) 1500 N
- (B) 6000 N
- (C) 600 N
- (D)  $1.5 \times 10^{11} \text{ N}$



**Q9.** The property of a material by which it breaks suddenly without undergoing any noticeable plastic deformation is called:

- (A) Ductility
- (B) Malleability
- (C) Toughness
- (D) Brittleness

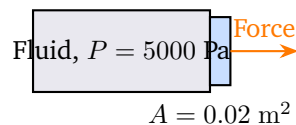
**Q10.** The SI unit of frequency is the:

- (A) Hertz
- (B) Pascal
- (C) Joule
- (D) Newton

**Q11.** One metric tonne is equal to:

- (A) 100 kg
- (B) 10 kg
- (C) 1000 kg
- (D) 10000 kg

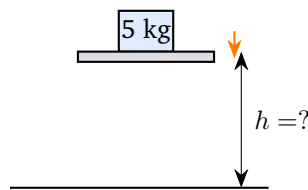
**Q12.** A hydraulic piston of face area  $0.02 \text{ m}^2$  is acted on by a fluid pressure of  $5000 \text{ Pa}$ , as shown. The force exerted on the piston is:



- (A) 250000 N
- (B) 100 N
- (C) 5000.02 N
- (D) 10 N



- Q13.** A metal block weighs 80 N in air. When fully immersed in water it experiences a buoyant force of 30 N. Its apparent weight in water is:
- (A) 110 N  
(B) 80 N  
(C) 50 N  
(D) 30 N
- Q14.** A hot body loses 2000 J of heat to a cold body in thermal contact, with no heat escaping to the surroundings. By the principle of calorimetry, the heat gained by the cold body is:
- (A) 4000 J  
(B) 1000 J  
(C) 0 J  
(D) 2000 J
- Q15.** A block of mass 5 kg is raised to a shelf, as shown, gaining 250 J of gravitational potential energy. Taking  $g = 10 \text{ m/s}^2$ , the height of the shelf is:



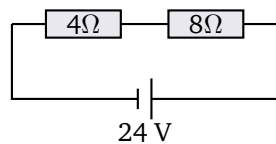
- (A) 50 m  
(B) 5 m  
(C) 2 m  
(D) 12.5 m



**Q16.** A potential difference of 24 V is applied across a resistor of  $8 \Omega$ . The current flowing through the resistor is:

- (A) 192 A
- (B) 32 A
- (C) 3 A
- (D) 16 A

**Q17.** Two resistors of  $4 \Omega$  and  $8 \Omega$  are connected in series across a 24 V battery, as shown. The current drawn from the battery is:



- (A) 6 A
- (B) 0.5 A
- (C) 288 A
- (D) 2 A

**Q18.** Three resistors, each of  $9 \Omega$ , are connected in parallel. Their combined resistance is:

- (A)  $3 \Omega$
- (B)  $27 \Omega$
- (C)  $9 \Omega$
- (D)  $18 \Omega$

**Q19.** An electrical appliance rated at 2 kW runs for 3 hours. The electrical energy it consumes is:

- (A) 0.67 kWh
- (B) 6 kWh
- (C) 5 kWh



(D) 1.5 kWh

**Q20.** Four identical cells, each of EMF 1.2 V, are connected in series. The total EMF of the combination is:

(A) 1.2 V

(B) 0.3 V

(C) 3.6 V

(D) 4.8 V

**Q21.** The device that converts chemical energy directly into electrical energy is the:

(A) Motor

(B) Generator

(C) Battery

(D) Transformer

**Q22.** According to Lenz's law, the direction of an induced current in a circuit is always such that it:

(A) adds to the change in magnetic flux that caused it

(B) opposes the change in magnetic flux that caused it

(C) is independent of the magnetic flux

(D) flows only when the flux is constant

**Q23.** In an electronic circuit, the basic component used to limit or control the amount of current is the:

(A) Capacitor

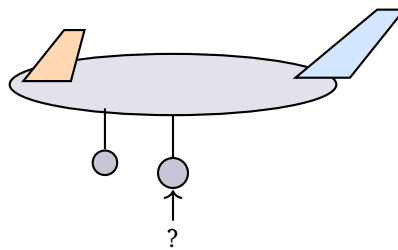
(B) Diode

(C) Transformer

(D) Resistor

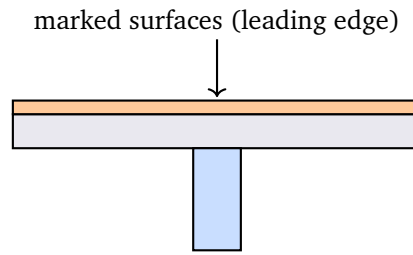


- Q24.** Alternating current (AC) is preferred over direct current (DC) for long-distance power transmission mainly because:
- (A) its voltage can be easily stepped up or down using transformers
  - (B) it cannot be transmitted through wires
  - (C) it never causes any power loss
  - (D) it does not require any conductors
- Q25.** The cockpit instrument that displays the aircraft's pitch and bank (its orientation relative to the horizon) is the:
- (A) Altimeter
  - (B) Attitude indicator (artificial horizon)
  - (C) Tachometer
  - (D) Fuel gauge
- Q26.** In the simplified aircraft outline shown, the wheeled assembly marked at the bottom, used for take-off, landing and ground movement, is called the:



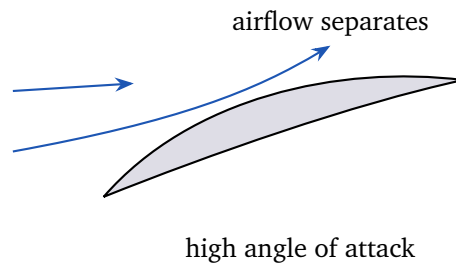
- (A) Empennage
  - (B) Fuselage
  - (C) Landing gear
  - (D) Aileron
- Q27.** The movable surfaces marked along the leading (front) edge of the wing in the figure extend forward to increase lift at low speeds, such as during take-off and landing. These surfaces are the:





- (A) Slats
- (B) Rudder
- (C) Elevator
- (D) Ailerons

**Q28.** As the angle of attack of the aerofoil shown is increased beyond a certain critical value, the smooth airflow separates from the upper surface and the lift suddenly drops. This condition is called a:



- (A) Climb
- (B) Stall
- (C) Roll
- (D) Cruise

**Q29.** An aircraft will begin to climb (gain altitude) when:

- (A) weight is greater than lift
- (B) drag is greater than thrust
- (C) lift exactly equals weight
- (D) lift is greater than weight



- Q30.** The aircraft system that maintains a comfortable, breathable cabin air pressure when flying at high altitude is the:
- (A) Pressurization system
  - (B) Fuel system
  - (C) Hydraulic system
  - (D) Ignition system



**Detailed Solutions**

Q1.

**Solution**

**Concept — Weight of a body:** The weight is the gravitational force on a body,  $W = mg$ , where  $m$  is its mass and  $g$  is the acceleration due to gravity.

**Step 1 — Write the formula:**

$$W = mg$$

**Step 2 — Substitute  $m = 6$  kg and  $g = 10$  m/s<sup>2</sup>:**

$$W = 6 \times 10$$

**Step 3 — Simplify:**

$$W = 60 \text{ N}$$

**Why other options are wrong:**

- Option A (0.6): divides mass by  $g$  instead of multiplying.
- Option B (16): adds mass and  $g$  rather than multiplying.
- Option D (6): gives only the mass, forgetting to multiply by  $g$ .

**Final Answer:** 60 N  $\Rightarrow$   C

Answer: (C) [Go Back to Q1](#)

Q2.

**Solution**

**Concept — Impulse:** Impulse equals force multiplied by the time for which it acts, and it equals the change in momentum,  $J = F \Delta t$ .

**Step 1 — Write the formula:**

$$J = F \Delta t$$

**Step 2 — Substitute  $F = 8$  N and  $\Delta t = 3$  s:**

$$J = 8 \times 3$$

**Step 3 — Simplify:**

$$J = 24 \text{ N} \cdot \text{s}$$



**Why other options are wrong:**

- Option A (2.67): divides force by time instead of multiplying.
- Option B (11): adds force and time.
- Option C (5): subtracts time from force.

**Final Answer:** 24 N·s ⇒  D

**Answer: (D)** [Go Back to Q2](#)

**Q3.**

### Solution

**Concept — Mechanical advantage of a lever:** For an ideal lever,  $MA = \frac{\text{effort arm}}{\text{load arm}}$ , so the load arm equals the effort arm divided by the MA.

**Step 1 — Rearrange the formula for the load arm:**

$$\text{load arm} = \frac{\text{effort arm}}{MA}$$

**Step 2 — Substitute effort arm = 90 cm and MA = 3:**

$$\text{load arm} = \frac{90}{3}$$

**Step 3 — Simplify:**

$$\text{load arm} = 30 \text{ cm}$$

**Why other options are wrong:**

- Option A (93): adds the MA to the effort arm.
- Option C (270): multiplies by the MA instead of dividing.
- Option D (87): subtracts the MA from the effort arm.

**Final Answer:** 30 cm ⇒  B

**Answer: (B)** [Go Back to Q3](#)



Q4.

**Solution**

**Concept — Work done by a varying force:** When the force grows uniformly from 0 to a maximum, the work equals the average force times the displacement,  $W = \frac{1}{2}F_{\max} x$ .

**Step 1 — Find the average force:**

$$F_{\text{avg}} = \frac{0 + 40}{2} = 20 \text{ N}$$

**Step 2 — Write the work formula:**

$$W = F_{\text{avg}} \times x$$

**Step 3 — Substitute  $F_{\text{avg}} = 20 \text{ N}$  and  $x = 0.2 \text{ m}$ :**

$$W = 20 \times 0.2$$

**Step 4 — Simplify:**

$$W = 4 \text{ J}$$

**Why other options are wrong:**

- Option B (8): uses the full maximum force instead of the average force.
- Option C (40): multiplies the maximum force by 1 m, ignoring the actual distance.
- Option D (0.5): divides instead of multiplying.

**Final Answer:** 4 J  $\Rightarrow$

[Go Back to Q4](#)

Q5.

**Solution**

**Concept — Energy from power and time:** The energy consumed equals power multiplied by time,  $E = P \times t$ , with time in seconds for an answer in joules.

**Step 1 — Convert the time to seconds:**

$$t = 2 \text{ min} = 2 \times 60 = 120 \text{ s}$$



**Step 2 — Write the formula:**

$$E = P \times t$$

**Step 3 — Substitute  $P = 1500 \text{ W}$  and  $t = 120 \text{ s}$ :**

$$E = 1500 \times 120$$

**Step 4 — Simplify:**

$$E = 180000 \text{ J}$$

**Why other options are wrong:**

- Option A (3000): uses only 2 seconds instead of 120 seconds.
- Option B (750): divides power by time.
- Option D (12.5): divides power by 120 instead of multiplying.

**Final Answer:** 180000 J  $\Rightarrow$   C

Answer: (C) [Go Back to Q5](#)

**Q6.**

### Solution

**Concept — Mechanical advantage of a pulley system:** Mechanical advantage is the ratio of load to effort, so the load equals the effort multiplied by the MA.

**Step 1 — Write the relation:**

$$\text{Load} = \text{Effort} \times \text{MA}$$

**Step 2 — Substitute Effort = 50 N and MA = 4:**

$$\text{Load} = 50 \times 4$$

**Step 3 — Simplify:**

$$\text{Load} = 200 \text{ N}$$

**Why other options are wrong:**

- Option A (12.5): divides the effort by the MA instead of multiplying.
- Option B (54): adds the MA to the effort.



- Option C (100): uses a mechanical advantage of 2 instead of 4.

**Final Answer:** 200 N  $\Rightarrow$

**Answer:** (D) [Go Back to Q6](#)

Q7.

### Solution

**Concept — Frictionless inclined plane:** On a smooth incline the effort needed to push a load up equals the weight times the ratio of the height to the length,

$$\text{Effort} = W \frac{h}{l}.$$

**Step 1 — Write the formula:**

$$\text{Effort} = W \times \frac{h}{l}$$

**Step 2 — Substitute  $W = 300 \text{ N}$ ,  $h = 2 \text{ m}$ ,  $l = 5 \text{ m}$ :**

$$\text{Effort} = 300 \times \frac{2}{5}$$

**Step 3 — Evaluate the ratio:**

$$\frac{2}{5} = 0.4$$

**Step 4 — Compute:**

$$\text{Effort} = 300 \times 0.4 = 120 \text{ N}$$

**Why other options are wrong:**

- Option B (750): multiplies by the length-to-height ratio (the inverse).
- Option C (600): multiplies the weight by the height alone.
- Option D (60): divides the weight by 5, ignoring the height.

**Final Answer:** 120 N  $\Rightarrow$

**Answer:** (A) [Go Back to Q7](#)



Q8.

**Solution**

**Concept — Stress, force and area:** Stress is force per unit area,  $\sigma = F/A$ , so the force equals stress multiplied by area,  $F = \sigma A$ .

**Step 1 — Rearrange the formula for force:**

$$F = \sigma \times A$$

**Step 2 — Substitute  $\sigma = 3 \times 10^7$  Pa and  $A = 2 \times 10^{-4}$  m<sup>2</sup>:**

$$F = (3 \times 10^7) \times (2 \times 10^{-4})$$

**Step 3 — Multiply the numbers and add the exponents:**

$$F = (3 \times 2) \times 10^{7-4} = 6 \times 10^3$$

**Step 4 — Write the result:**

$$F = 6000 \text{ N}$$

**Why other options are wrong:**

- Option A (1500): divides stress by area instead of multiplying.
- Option C (600): uses the wrong power of ten.
- Option D ( $1.5 \times 10^{11}$ ): divides instead of multiplying, mishandling the exponents.

**Final Answer:** 6000 N  $\Rightarrow$   B

Answer: (B) [Go Back to Q8](#)

Q9.

**Solution**

**Concept — Brittleness:** Brittleness is the property by which a material fractures suddenly, with little or no plastic (permanent) deformation before breaking.

**Step 1 — Match the description:** “Breaks suddenly without noticeable deformation” is the defining feature of a brittle material.

**Step 2 — Confirm with examples:** Cast iron, glass and ceramics are brittle, snapping rather than bending.



**Why other options are wrong:**

- Option A (Ductility): the ability to be drawn into wires, the opposite of brittle.
- Option B (Malleability): the ability to be hammered into sheets, again requiring deformation.
- Option C (Toughness): the ability to absorb energy before fracture, which brittle materials lack.

**Final Answer:** Brittleness  $\Rightarrow$

**Answer: (D)** [Go Back to Q9](#)

**Q10.**

**Solution**

**Concept — SI units:** Frequency is the number of cycles per second, and its SI unit is the hertz (Hz), equal to one cycle per second.

**Step 1 — Recall the definition of frequency:**

$$\text{Frequency} = \frac{\text{number of cycles}}{\text{time}} = \frac{1}{\text{s}}$$

**Step 2 — Name the unit:**

$$1 \frac{1}{\text{s}} = 1 \text{ hertz (Hz)}$$

**Why other options are wrong:**

- Option B (Pascal): the unit of pressure.
- Option C (Joule): the unit of energy or work.
- Option D (Newton): the unit of force.

**Final Answer:** Hertz  $\Rightarrow$

**Answer: (A)** [Go Back to Q10](#)



Q11.

**Solution**

**Concept — Tonne to kilogram conversion:** One metric tonne is defined as one thousand kilograms.

**Step 1 — Recall the definition:**

$$1 \text{ tonne} = 1000 \text{ kg}$$

**Step 2 — State the result directly:** The required conversion is therefore 1000 kg.

**Why other options are wrong:**

- Option A (100): confuses a tonne with a quintal (100 kg).
- Option B (10): far too small by a factor of one hundred.
- Option D (10000): too large by a factor of ten.

**Final Answer:** 1000 kg  $\Rightarrow$

**Answer:** (C) [Go Back to Q11](#)

Q12.

**Solution**

**Concept — Pressure, force and area:** Pressure is force per unit area,  $P = F/A$ , so the force on a piston equals pressure multiplied by its area,  $F = PA$ .

**Step 1 — Rearrange the formula for force:**

$$F = P \times A$$

**Step 2 — Substitute  $P = 5000 \text{ Pa}$  and  $A = 0.02 \text{ m}^2$ :**

$$F = 5000 \times 0.02$$

**Step 3 — Simplify:**

$$F = 100 \text{ N}$$

**Why other options are wrong:**

- Option A (250000): divides pressure by area instead of multiplying.
- Option C (5000.02): adds pressure and area.



- Option D (10): off by a factor of ten in the arithmetic.

**Final Answer:** 100 N  $\Rightarrow$  B

**Answer:** (B) [Go Back to Q12](#)

**Q13.**

### Solution

**Concept — Apparent weight in a fluid:** When a body is immersed in a fluid, its apparent weight equals its true weight minus the buoyant (upthrust) force.

**Step 1 — Write the relation:**

$$W_{\text{apparent}} = W_{\text{air}} - F_{\text{buoyant}}$$

**Step 2 — Substitute  $W_{\text{air}} = 80 \text{ N}$  and  $F_{\text{buoyant}} = 30 \text{ N}$ :**

$$W_{\text{apparent}} = 80 - 30$$

**Step 3 — Simplify:**

$$W_{\text{apparent}} = 50 \text{ N}$$

**Why other options are wrong:**

- Option A (110): adds the buoyant force instead of subtracting it.
- Option B (80): ignores the buoyant force entirely.
- Option D (30): gives the buoyant force, not the apparent weight.

**Final Answer:** 50 N  $\Rightarrow$  C

**Answer:** (C) [Go Back to Q13](#)

**Q14.**

### Solution

**Concept — Principle of calorimetry:** When no heat escapes to the surroundings, the heat lost by the hot body exactly equals the heat gained by the cold body.

**Step 1 — State the principle:**

$$\text{Heat lost} = \text{Heat gained}$$



**Step 2 — Substitute the heat lost = 2000 J:**

$$\text{Heat gained} = 2000 \text{ J}$$

**Step 3 — Interpret:** Energy is conserved, so the cold body must take in exactly what the hot body releases.

**Why other options are wrong:**

- Option A (4000): doubles the heat, violating energy conservation.
- Option B (1000): assumes half is lost, but the problem states no loss to surroundings.
- Option C (0): would mean no heat transfer at all, contradicting the question.

**Final Answer:** 2000 J  $\Rightarrow$

[Go Back to Q14](#)

**Q15.**

### Solution

**Concept — Gravitational potential energy:** The potential energy gained is  $PE = mgh$ , so the height equals the PE divided by  $mg$ .

**Step 1 — Rearrange the formula for height:**

$$h = \frac{PE}{mg}$$

**Step 2 — Compute the denominator  $mg$  with  $m = 5 \text{ kg}$  and  $g = 10 \text{ m/s}^2$ :**

$$mg = 5 \times 10 = 50$$

**Step 3 — Substitute  $PE = 250 \text{ J}$ :**

$$h = \frac{250}{50}$$

**Step 4 — Simplify:**

$$h = 5 \text{ m}$$

**Why other options are wrong:**



- Option A (50): gives  $mg$  rather than the height.
- Option C (2): divides  $mg$  by the wrong quantity.
- Option D (12.5): divides the PE by 20 instead of 50.

Final Answer: 5 m  $\Rightarrow$

Answer: (B) [Go Back to Q15](#)

Q16.

### Solution

**Concept — Ohm's law:** The current through a resistor equals the voltage across it divided by its resistance,  $I = V/R$ .

**Step 1 — Write the formula:**

$$I = \frac{V}{R}$$

**Step 2 — Substitute  $V = 24 \text{ V}$  and  $R = 8 \Omega$ :**

$$I = \frac{24}{8}$$

**Step 3 — Simplify:**

$$I = 3 \text{ A}$$

**Why other options are wrong:**

- Option A (192): multiplies voltage by resistance instead of dividing.
- Option B (32): adds voltage and resistance.
- Option D (16): subtracts resistance from voltage.

Final Answer: 3 A  $\Rightarrow$

Answer: (C) [Go Back to Q16](#)

Q17.

### Solution

**Concept — Series circuit current:** In a series circuit the resistances add, and the current is the supply voltage divided by the total resistance.



**Step 1 — Find the total resistance:**

$$R_{\text{total}} = 4 + 8 = 12 \Omega$$

**Step 2 — Apply Ohm's law for current:**

$$I = \frac{V}{R_{\text{total}}}$$

**Step 3 — Substitute  $V = 24 \text{ V}$  and  $R_{\text{total}} = 12 \Omega$ :**

$$I = \frac{24}{12}$$

**Step 4 — Simplify:**

$$I = 2 \text{ A}$$

**Why other options are wrong:**

- Option A (6): divides 24 by only one resistor ( $4 \Omega$ ).
- Option B (0.5): inverts the ratio.
- Option C (288): multiplies voltage by total resistance.

**Final Answer:**  $2 \text{ A} \Rightarrow \boxed{\text{D}}$

**Answer: (D)** [Go Back to Q17](#)

**Q18.**

### Solution

**Concept — Equal resistors in parallel:** For  $n$  equal resistors of value  $R$  in parallel, the combined resistance is  $R/n$ .

**Step 1 — Write the parallel formula:**

$$\frac{1}{R_p} = \frac{1}{R} + \frac{1}{R} + \frac{1}{R}$$

**Step 2 — Substitute  $R = 9 \Omega$ :**

$$\frac{1}{R_p} = \frac{1}{9} + \frac{1}{9} + \frac{1}{9} = \frac{3}{9}$$



**Step 3 — Invert to find  $R_p$ :**

$$R_p = \frac{9}{3} = 3 \Omega$$

**Why other options are wrong:**

- Option B (27): adds the resistors as if in series.
- Option C (9): leaves a single resistor value.
- Option D (18): doubles a single resistor, an incorrect step.

**Final Answer:**  $3 \Omega \Rightarrow$

**Answer: (A)** [Go Back to Q18](#)

**Q19.**

### Solution

**Concept — Electrical energy in kilowatt-hours:** Energy equals power (in kW) multiplied by time (in hours),  $E = P \times t$ .

**Step 1 — Write the formula:**

$$E = P \times t$$

**Step 2 — Substitute  $P = 2$  kW and  $t = 3$  h:**

$$E = 2 \times 3$$

**Step 3 — Simplify:**

$$E = 6 \text{ kWh}$$

**Why other options are wrong:**

- Option A (0.67): divides power by time instead of multiplying.
- Option C (5): adds power and time.
- Option D (1.5): divides time by power.

**Final Answer:**  $6 \text{ kWh} \Rightarrow$

**Answer: (B)** [Go Back to Q19](#)



Q20.

**Solution**

**Concept — Cells in series:** When cells are connected in series, their EMFs add together.

**Step 1 — Write the relation:**

$$E_{\text{total}} = E_1 + E_2 + E_3 + E_4$$

**Step 2 — Substitute four cells of 1.2 V each:**

$$E_{\text{total}} = 1.2 + 1.2 + 1.2 + 1.2$$

**Step 3 — Add (or multiply 1.2 by 4):**

$$E_{\text{total}} = 4 \times 1.2 = 4.8 \text{ V}$$

**Why other options are wrong:**

- Option A (1.2): the EMF of a single cell only.
- Option B (0.3): divides instead of adding.
- Option C (3.6): adds only three cells.

**Final Answer:** 4.8 V  $\Rightarrow$   D

Answer: (D) [Go Back to Q20](#)

Q21.

**Solution**

**Concept — Battery:** A battery (electrochemical cell) converts the chemical energy stored in its reactants directly into electrical energy.

**Step 1 — Identify the energy conversion:** Input is chemical energy; output is electrical energy.

**Step 2 — Match to the device:** The device performing chemical  $\rightarrow$  electrical conversion is the battery.

**Why other options are wrong:**

- Option A (Motor): converts electrical energy into mechanical energy.



- Option B (Generator): converts mechanical energy into electrical energy.
- Option D (Transformer): only changes AC voltage levels, with no chemical input.

**Final Answer:** Battery  $\Rightarrow$

**Answer:** (C) [Go Back to Q21](#)

Q22.

### Solution

**Concept — Lenz's law:** The induced current always flows in a direction that opposes the change in magnetic flux producing it; this is a statement of energy conservation.

**Step 1 — Recall the law:** The induced effect resists the cause, so the current opposes the changing flux.

**Step 2 — Select the matching statement:** "Opposes the change in magnetic flux that caused it" is exactly Lenz's law.

**Why other options are wrong:**

- Option A (adds to the change): would create energy from nothing, violating conservation.
- Option C (independent of flux): induction depends entirely on the changing flux.
- Option D (only when flux is constant): induction needs a *changing* flux, not a constant one.

**Final Answer:** opposes the change in magnetic flux  $\Rightarrow$

**Answer:** (B) [Go Back to Q22](#)

Q23.

### Solution

**Concept — Resistor:** A resistor is the basic passive component used to limit or control the amount of current in a circuit by providing a known resistance.

**Step 1 — Recall the function:** By Ohm's law, increasing resistance reduces the current for a given voltage.

**Step 2 — Match the function to the component:** The component whose job is



to limit current is the resistor.

**Why other options are wrong:**

- Option A (Capacitor): stores charge and energy in an electric field.
- Option B (Diode): allows current in one direction only, it does not set its level.
- Option C (Transformer): changes AC voltage levels by induction.

**Final Answer:** Resistor  $\Rightarrow$

[Go Back to Q23](#)

Q24.

### Solution

**Concept — AC for power transmission:** AC voltage can be stepped up for transmission and stepped down for use by transformers; high transmission voltage lowers the current and so reduces  $I^2R$  losses in the lines.

**Step 1 — Recall the role of transformers:** Transformers work only with alternating current, easily raising or lowering AC voltage.

**Step 2 — State the advantage:** Transmitting at high voltage and low current minimises power loss, which is why AC is preferred.

**Why other options are wrong:**

- Option B (cannot be transmitted): false, AC is transmitted over long lines worldwide.
- Option C (never causes power loss): no real transmission is lossless.
- Option D (needs no conductors): all line transmission needs conductors.

**Final Answer:** its voltage can be easily stepped up or down  $\Rightarrow$

[Go Back to Q24](#)

Q25.

### Solution

**Concept — Attitude indicator:** The attitude indicator (artificial horizon) shows the aircraft's orientation relative to the horizon, that is, its pitch (nose up/down) and bank (roll).



**Step 1 — Match the function to the instrument:** Displaying pitch and bank against a horizon line is the role of the attitude indicator.

**Step 2 — Confirm its use:** It is essential for flying when the natural horizon is not visible, such as in cloud.

**Why other options are wrong:**

- Option A (Altimeter): shows height above sea level, not orientation.
- Option C (Tachometer): shows engine rotational speed.
- Option D (Fuel gauge): shows the quantity of fuel remaining.

**Final Answer:** Attitude indicator (artificial horizon) ⇒

[Go Back to Q25](#)

Q26.

### Solution

**Concept — Landing gear:** The landing gear (undercarriage) is the wheeled assembly that supports the aircraft on the ground and is used for take-off, landing and taxiing.

**Step 1 — Identify the marked part:** The wheels and struts at the bottom of the outline form the landing gear.

**Step 2 — Confirm its role:** It absorbs the landing impact and allows the aircraft to roll on the ground.

**Why other options are wrong:**

- Option A (Empennage): the tail assembly, not the wheels.
- Option B (Fuselage): the central body of the aircraft.
- Option D (Aileron): a roll-control surface on the wing.

**Final Answer:** Landing gear ⇒

[Go Back to Q26](#)



Q27.

**Solution**

**Concept — Slats:** Slats are movable high-lift devices on the leading edge of the wing; they extend forward to delay the stall and increase lift at low speeds.

**Step 1 — Identify the location:** The marked surfaces are on the leading (front) edge of the wing.

**Step 2 — Match the function:** Leading-edge devices that boost lift for take-off and landing are the slats.

**Why other options are wrong:**

- Option B (Rudder): on the vertical tail, controls yaw.
- Option C (Elevator): on the horizontal tail, controls pitch.
- Option D (Ailerons): on the trailing edge of the wing, control roll.

**Final Answer:** Slats  $\Rightarrow$

[Go Back to Q27](#)

Q28.

**Solution**

**Concept — Stall:** A stall occurs when the angle of attack exceeds a critical value; the airflow separates from the upper surface of the wing and lift falls sharply.

**Step 1 — Recall the cause:** Increasing the angle of attack too far breaks up the smooth airflow over the wing.

**Step 2 — Name the condition:** The sudden loss of lift due to airflow separation at a high angle of attack is the stall.

**Why other options are wrong:**

- Option A (Climb): a steady gain of altitude, not a loss of lift.
- Option C (Roll): rotation about the longitudinal axis, unrelated to flow separation.
- Option D (Cruise): steady level flight at normal angle of attack.

**Final Answer:** Stall  $\Rightarrow$

[Go Back to Q28](#)



Q29.

**Solution**

**Concept — Forces in a climb:** An aircraft climbs when the upward lift exceeds the downward weight, giving a net upward force.

**Step 1 — Compare the vertical forces:** For altitude to increase, the net vertical force must be upward.

**Step 2 — State the condition:** This happens when lift is greater than weight.

**Why other options are wrong:**

- Option A (weight > lift): a net downward force, which causes a descent.
- Option B (drag > thrust): slows the aircraft down, it does not cause a climb.
- Option C (lift = weight): the balanced condition of steady level flight.

**Final Answer:** lift is greater than weight  $\Rightarrow$

**Answer: (D)** [Go Back to Q29](#)

Q30.

**Solution**

**Concept — Cabin pressurization system:** The pressurization system keeps the cabin air at a comfortable, breathable pressure when the aircraft flies at high altitude where the outside air is thin.

**Step 1 — Identify the need:** At cruise altitude the outside pressure is too low to breathe safely.

**Step 2 — Match to the system:** The system that supplies and maintains higher cabin pressure is the pressurization system.

**Why other options are wrong:**

- Option B (Fuel system): stores and delivers fuel to the engines.
- Option C (Hydraulic system): operates landing gear, flaps and brakes.
- Option D (Ignition system): starts and sustains combustion in the engine.

**Final Answer:** Pressurization system  $\Rightarrow$

**Answer: (A)** [Go Back to Q30](#)



## Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	C	2	D	3	B	4	A	5	C
6	D	7	A	8	B	9	D	10	A
11	C	12	B	13	C	14	D	15	B
16	C	17	D	18	A	19	B	20	D
21	C	22	B	23	D	24	A	25	B
26	C	27	A	28	B	29	D	30	A

