AME CET Technical Aptitude

Sample Paper – 9

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. A lift of mass 500 kg is pulled upward by a cable that exerts a net upward force of 1000 N on it (over and above its weight). The acceleration of the lift is:

(A) 0.5 m/s^2 downward

(B) 5 m/s^2 upward

(C) 2 m/s^2 upward

(D) 1000 m/s^2 upward

Q2. A body of mass 2 kg moves at 6 m/s. A second body of mass 3 kg moves so that it has the *same* momentum as the first. The speed of the second body is:

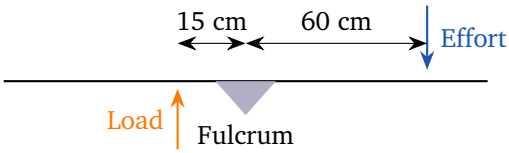
(A) 6 m/s

(B) 4 m/s

(C) 9 m/s

(D) 18 m/s

Q3. In the class-1 lever shown, the effort arm is 60 cm and the load arm is 15 cm. The ideal mechanical advantage of the lever is:



(A) 0.25

(B) 75

(C) 45

(D) 4

Q4. A pump lifts 50 kg of water to a height of 8 m. Taking $g = 10$ m/s^2, the work done against gravity is:

(A) 4000 J

(B) 400 J

(C) 58 J

(D) 6.25 J

Q5. A person of mass 60 kg climbs a staircase of vertical height 5 m in 10 s. Taking $g = 10$ m/s^2, the power developed is:

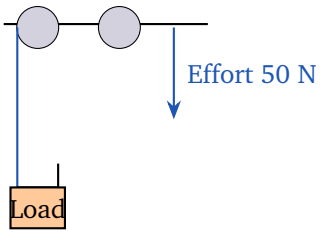
(A) 30 W

(B) 3000 W

(C) 300 W

(D) 120 W

Q6. A system of two movable pulleys (ideal, weightless and frictionless) has a mechanical advantage of 4. If an effort of 50 N is applied, the load that can just be lifted is, as shown:



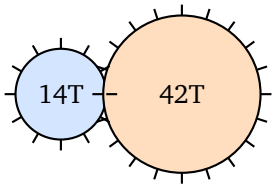
(A) 12.5 N

(B) 50 N

(C) 100 N

(D) 200 N

Q7. A driver gear with 14 teeth meshes with a driven gear of 42 teeth, as shown. The gear ratio (number of driver turns needed per single turn of the driven gear) of this gear pair is:



(A) 3

(B) $\frac{1}{3}$

(C) 28

(D) 56

Q8. A wire of cross-sectional area 2×10^{-6} m^2 supports a hanging mass of 4 kg. Taking $g = 10$ m/s^2, the stress in the wire is:

(A) 2×10^{7} Pa

(B) 2×10^{5} Pa

(C) 8×10^{-6} Pa

(D) 2×10^{-7} Pa

Q9. The property of a metal that allows it to easily carry heat and electric current through its body is called:

(A) Brittleness

(B) Elasticity

(C) Conductivity

(D) Malleability

Q10. The SI base unit of thermodynamic temperature is the:

(A) Celsius

(B) Kelvin

(C) Joule

(D) Watt

Q11. An ordinary metre ruler is marked in millimetres (its smallest marked division is 1 mm). The least count of this ruler is:

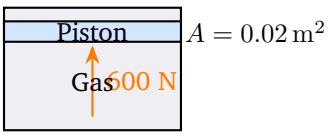
(A) 0.01 mm

(B) 0.1 mm

(C) 1 cm

(D) 1 mm

Q12. Gas trapped in a cylinder pushes on a piston of area 0.02 m^2 with a force of 600 N, as shown. The pressure of the gas on the piston is:



(A) 30000 Pa

(B) 12 Pa

(C) 300 Pa

(D) 3000 Pa

Q13. A block of aluminium has a volume of 0.5 m^3. Taking the density of aluminium as 2700 kg/m^3, the mass of the block is:

(A) 5400 kg

(B) 1350 kg

(C) 2700 kg

(D) 540 kg

Q14. Two equal masses of the same liquid, one at $30\,^\circ$C and the other at $50\,^\circ$C, are mixed in an insulated container. Assuming no heat loss, the final temperature of the mixture is:

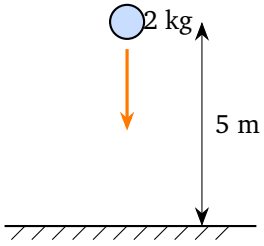
(A) $80\,^\circ$C

(B) $20\,^\circ$C

(C) $40\,^\circ$C

(D) $35\,^\circ$C

Q15. A ball of mass 2 kg is held at a height of 5 m and then released to fall freely, as shown. Taking $g = 10$ m/s^2, its total mechanical energy (KE + PE) just before it hits the ground is:



(A) 50 J

(B) 10 J

(C) 25 J

(D) 100 J

Part B: Electrical, Electronics & Aviation Technical Fundamentals

Q16. A voltage of 24 V is applied across a resistor and a current of 3 A flows through it. The resistance of the resistor is:

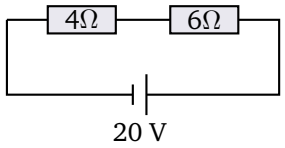
(A) 72 Ω

(B) 27 Ω

(C) 8 Ω

(D) 0.125 Ω

Q17. Two resistors of 4 Ω and 6 Ω are connected in series across a 20 V battery, as shown. The current drawn from the battery is:



(A) 0.5 A

(B) 2 A

(C) 10 A

(D) 5 A

Q18. Two resistors, each of 8 Ω, are connected in parallel. Their combined resistance is:

(A) 4 Ω

(B) 16 Ω

(C) 8 Ω

(D) 2 Ω

Q19. A 20 V supply is connected across a 10 Ω resistor. The power dissipated in the resistor is:

(A) 2 W

(B) 200 W

(C) 4 W

(D) 40 W

Q20. The EMF of a cell is best described as:

(A) the current the cell can deliver to any circuit

(B) the potential difference across its terminals when no current is drawn

(C) the resistance offered by the electrolyte inside the cell

(D) the charge stored on the plates of the cell

Q21. Which device converts sound energy into an electrical signal?

(A) Loudspeaker

(B) Electric motor

(C) Microphone

(D) Transformer

Q22. The strength of an electromagnet can be increased by:

(A) decreasing the current through the coil

(B) reducing the number of turns in the coil

(C) removing the soft-iron core from the coil

(D) increasing the current and the number of turns of the coil

Q23. Compared with a half-wave rectifier, a full-wave rectifier uses:

(A) both halves of each AC cycle, giving a smoother DC output

(B) only the positive half of each AC cycle

(C) no diodes at all

(D) an AC output instead of a DC output

Q24. Which of the following is a source of direct current (DC)?

(A) The domestic mains wall socket

(B) A dry cell (battery)

(C) A power-station alternator

(D) A bicycle dynamo

Q25. The cockpit instrument that warns the pilot about the lubrication of a piston engine by showing the pressure of its lubricating oil is the:

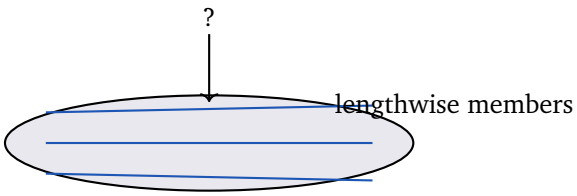
(A) Altimeter

(B) Airspeed indicator

(C) Oil pressure gauge

(D) Magnetic compass

Q26. In the simplified fuselage outline shown, the long thin members that run lengthwise (front to back) and stiffen the skin are the:



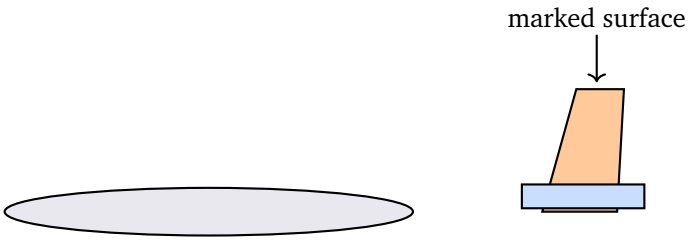
(A) Ribs

(B) Ailerons

(C) Wing spars

(D) Stringers (longerons)

Q27. The fixed vertical tail surface marked in the figure gives the aircraft directional (weathercock) stability about its vertical axis. This surface is the:



(A) Vertical stabilizer (fin)

(B) Aileron

(C) Horizontal stabilizer

(D) Flap

Q28. An aerofoil moves through the air as shown. The "relative wind" (relative airflow) experienced by the aerofoil is directed:

(A) in the same direction as the aerofoil's motion

(B) opposite to the direction of the aerofoil's motion

(C) vertically upward, regardless of motion

(D) vertically downward, regardless of motion

Q29. The aerodynamic lift produced by a wing always acts in a direction that is:

(A) along the direction of the relative wind

(B) opposite to the relative wind

(C) straight down toward the centre of the earth

(D) perpendicular to the relative wind

Q30. Which aircraft system keeps the cabin air at a comfortable temperature, supplying cooling and heating to the occupied compartments?

(A) Environmental control (air-conditioning) system

(B) Fuel system

(C) Ignition system

(D) Hydraulic system

Detailed Solutions

Q1.

Solution

Concept — Newton's second law: The acceleration produced by a net force equals that force divided by the mass, $a = F_{\text{net}}/m$. Here the 1000 N is the resultant upward force already remaining after gravity is accounted for.

Step 1 — Write the formula:

$$a = \frac{F_{\text{net}}}{m}$$

Step 2 — Substitute $F_{\text{net}} = 1000$ N and $m = 500$ kg:

$$a = \frac{1000}{500}$$

Step 3 — Simplify:

$$a = 2 \text{ m/s}^2$$

Step 4 — Decide the direction: The net force is upward, so the acceleration is 2 m/s^2 directed upward.

Why other options are wrong:

- Option A (0.5 down): inverts the ratio and reverses the direction.
- Option B (5 up): divides by 200 instead of 500.
- Option D (1000 up): mistakes the force value for the acceleration.

Final Answer: 2 m/s^2 upward $\Rightarrow$ C

Answer: (C) Go Back to Q1

Q2.

Solution

Concept — Linear momentum: Momentum is mass times velocity, $p = mv$. Two bodies have the same momentum when their products mv are equal.

Step 1 — Find the momentum of the first body:

$$p_1 = m_1 v_1 = 2 \times 6 = 12 \text{ kg} \cdot \text{m/s}$$

Step 2 — Set the second body's momentum equal:

$$m_2 v_2 = 12$$

Step 3 — Substitute $m_2 = 3$ kg and solve for v_2:

$$3 \times v_2 = 12$$

$$v_2 = \frac{12}{3} = 4 \text{ m/s}$$

Why other options are wrong:

- Option A (6): copies the first body's speed, ignoring the mass difference.
- Option C (9): adds masses and velocities incorrectly.
- Option D (18): multiplies 6 by 3 instead of dividing 12 by 3.

Final Answer: 4 m/s $\Rightarrow$ B

Answer: (B) Go Back to Q2

Q3.

Solution

Concept — Mechanical advantage of a lever: For an ideal lever the mechanical advantage is the effort arm divided by the load arm.

Step 1 — Write the formula:

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

Step 2 — Substitute effort arm $= 60$ cm and load arm $= 15$ cm:

$$\text{MA} = \frac{60}{15}$$

Step 3 — Simplify:

$$\text{MA} = 4$$

Why other options are wrong:

- Option A (0.25): inverts the ratio (load arm over effort arm).
- Option B (75): adds the two arm lengths.

- Option C (45): subtracts the arm lengths.

Final Answer: 4 $\Rightarrow$ D

Answer: (D) Go Back to Q3

Q4.

Solution

Concept — Work done against gravity: Lifting a mass m through a height h requires work $W = mgh$.

Step 1 — Write the formula:

$$W = mgh$$

Step 2 — Substitute $m = 50$ kg, $g = 10$ m/s^2, $h = 8$ m:

$$W = 50 \times 10 \times 8$$

Step 3 — Multiply step by step:

$$50 \times 10 = 500$$

$$500 \times 8 = 4000 \text{ J}$$

Why other options are wrong:

- Option B (400): drops a factor of ten.
- Option C (58): adds the quantities instead of multiplying.
- Option D (6.25): divides instead of multiplying.

Final Answer: 4000 J $\Rightarrow$ A

Answer: (A) Go Back to Q4

Q5.

Solution

Concept — Power while climbing: Power is work done per unit time. The work to climb is mgh, so $P = mgh/t$.

Step 1 — Write the formula:

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

Step 2 — Substitute $m = 60$ kg, $g = 10$, $h = 5$ m, $t = 10$ s:

$$P = \frac{60 \times 10 \times 5}{10}$$

Step 3 — Evaluate the numerator:

$$60 \times 10 \times 5 = 3000$$

Step 4 — Divide by the time:

$$P = \frac{3000}{10} = 300 \text{ W}$$

Why other options are wrong:

- Option A (30): divides by 100 instead of 10.
- Option B (3000): forgets to divide by the time.
- Option D (120): mishandles the arithmetic of the product.

Final Answer: 300 W $\Rightarrow$ C

Answer: (C) Go Back to Q5

Q6.

Solution

Concept — Mechanical advantage of a pulley system: Mechanical advantage is the load divided by the effort, so the load equals the effort times the mechanical advantage.

Step 1 — Write the relation:

$$\text{MA} = \frac{\text{Load}}{\text{Effort}} \quad \Rightarrow \quad \text{Load} = \text{MA} \times \text{Effort}$$

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

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

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 (50): assumes no mechanical advantage.
- Option C (100): uses a mechanical advantage of 2, not 4.

Final Answer: 200 N $\Rightarrow$ D

Answer: (D) Go Back to Q6

Q7.

Solution

Concept — Gear ratio: For a meshing pair, the gear ratio (how many turns the *driver* makes for one turn of the driven, equivalently the speed-reduction factor) equals the number of teeth on the driven gear divided by the teeth on the driver gear.

Step 1 — Write the relation:

$$\text{Gear ratio} = \frac{T_{\text{driven}}}{T_{\text{driver}}}$$

Step 2 — Substitute $T_{\text{driven}} = 42$ and $T_{\text{driver}} = 14$:

$$\text{Gear ratio} = \frac{42}{14}$$

Step 3 — Simplify:

$$\text{Gear ratio} = 3$$

Why other options are wrong:

- Option B ($\frac{1}{3}$): inverts the ratio.
- Option C (28): subtracts the tooth counts ($42 - 14 = 28$).
- Option D (56): adds the tooth counts ($42 + 14 = 56$).

Final Answer: 3 $\Rightarrow$ A

Answer: (A) Go Back to Q7

Q8.

Solution

Concept — Stress in a loaded wire: Stress is the force per unit cross-sectional area, $\sigma = F/A$. The pulling force is the weight of the hanging mass, $F = mg$.

Step 1 — Find the force (weight):

$$F = mg = 4 \times 10 = 40 \text{ N}$$

Step 2 — Write the stress formula:

$$\sigma = \frac{F}{A}$$

Step 3 — Substitute $F = 40$ N and $A = 2 \times 10^{-6}$ m^2:

$$\sigma = \frac{40}{2 \times 10^{-6}}$$

Step 4 — Simplify:

$$\sigma = 20 \times 10^{6} = 2 \times 10^{7} \text{ Pa}$$

Why other options are wrong:

- Option B (2×10^{5}): off by a factor of 100 in the area exponent.
- Option C (8×10^{-6}): multiplies by the area instead of dividing.
- Option D (2×10^{-7}): inverts the whole calculation.

Final Answer: 2×10^{7} Pa $\Rightarrow$ A

Answer: (A) Go Back to Q8

Q9.

Solution

Concept — Mechanical/physical properties of metals: Conductivity is the ability of a material to carry heat and electric current readily through its body.

Step 1 — Match the definition: "Easily carries heat and electric current" is the defining description of conductivity.

Step 2 — Confirm the property: Metals such as copper and silver are excellent conductors, which is why they are used in wiring and heat sinks.

Why other options are wrong:

- Option A (Brittleness): the tendency to fracture without much deformation.
- Option B (Elasticity): the ability to return to original shape after a load is removed.
- Option D (Malleability): the ability to be hammered into thin sheets.

Final Answer: Conductivity $\Rightarrow$ C

Answer: (C) Go Back to Q9

Q10.

Solution

Concept — SI base units: Thermodynamic temperature is one of the seven SI base quantities, and its base unit is the kelvin (K).

Step 1 — Recall the SI base quantities: Temperature is a base quantity, alongside length, mass, time, current, amount of substance and luminous intensity.

Step 2 — Name the base unit: The SI base unit of thermodynamic temperature is the kelvin.

Why other options are wrong:

- Option A (Celsius): a common temperature scale, but not the SI base unit.
- Option C (Joule): the unit of energy or heat.
- Option D (Watt): the unit of power.

Final Answer: Kelvin $\Rightarrow$ B

Answer: (B) Go Back to Q10

Q11.

Solution

Concept — Least count of a scale: The least count of any measuring scale is the value of its smallest marked division.

Step 1 — Identify the smallest division: The metre ruler is marked in millimetres, so its smallest division is 1 mm.

Step 2 — State the least count:

$$\text{Least count} = 1 \text{ mm}$$

Why other options are wrong:

- Option A (0.01 mm): the least count of a screw gauge, not a ruler.
- Option B (0.1 mm): the least count of a typical vernier calliper.
- Option C (1 cm): the spacing of the major divisions, not the smallest one.

Final Answer: 1 mm $\Rightarrow$ D

Answer: (D) Go Back to Q11

Q12.

Solution

Concept — Pressure on a piston: Pressure is the normal force divided by the area over which it acts, $P = F/A$.

Step 1 — Write the formula:

$$P = \frac{F}{A}$$

Step 2 — Substitute $F = 600$ N and $A = 0.02$ m^2:

$$P = \frac{600}{0.02}$$

Step 3 — Simplify:

$$P = 30000 \text{ Pa}$$

Why other options are wrong:

- Option B (12): multiplies force by area instead of dividing.
- Option C (300): divides by 2 instead of 0.02.
- Option D (3000): off by a factor of ten in the decimal.

Final Answer: 30000 Pa $\Rightarrow$ A

Answer: (A) Go Back to Q12

Q13.

Solution

Concept — Density: Density is mass per unit volume, $\rho = m/V$, so the mass is $m = \rho V$.

Step 1 — Rearrange the formula for mass:

$$m = \rho V$$

Step 2 — Substitute $\rho = 2700$ kg/m^3 and $V = 0.5$ m^3:

$$m = 2700 \times 0.5$$

Step 3 — Simplify:

$$m = 1350 \text{ kg}$$

Why other options are wrong:

- Option A (5400): divides by 0.5 instead of multiplying.
- Option C (2700): ignores the volume entirely.
- Option D (540): off by a factor of ten.

Final Answer: 1350 kg $\Rightarrow$ B

Answer: (B) Go Back to Q13

Q14.

Solution

Concept — Mixing equal masses of the same liquid: When equal masses of the same liquid are mixed, heat lost by the hot portion equals heat gained by the cold portion, and the final temperature is simply the average of the two starting temperatures.

Step 1 — Write the average relation:

$$T_{\text{final}} = \frac{T_1 + T_2}{2}$$

Step 2 — Substitute $T_1 = 30\,^\circ$C and $T_2 = 50\,^\circ$C:

$$T_{\text{final}} = \frac{30 + 50}{2}$$

Step 3 — Simplify:

$$T_{\text{final}} = \frac{80}{2} = 40\,^{\circ}\text{C}$$

Why other options are wrong:

- Option A (80): adds the temperatures without dividing by two.
- Option B (20): takes the difference instead of the average.
- Option D (35): an incorrect weighting of the two temperatures.

Final Answer: $40\,^{\circ}\text{C} \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q14

Q15.

Solution

Concept — Conservation of mechanical energy: For a freely falling body (no friction), the total mechanical energy stays constant. At the top it is all potential energy, so the total equals the initial PE, mgh.

Step 1 — Find the initial potential energy:

$$\text{PE} = mgh$$

Step 2 — Substitute $m = 2$ kg, $g = 10$, $h = 5$ m:

$$\text{PE} = 2 \times 10 \times 5$$

Step 3 — Simplify:

$$\text{PE} = 100 \text{ J}$$

Step 4 — Apply conservation of energy: Since total mechanical energy is conserved, the total energy just before landing is also 100 J (now entirely kinetic).

Why other options are wrong:

- Option A (50): uses half the height or a stray factor of one-half.
- Option B (10): multiplies only two of the three quantities.
- Option C (25): an unrelated arithmetic slip.

Final Answer: $100 \text{ J} \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q15

Q16.

Solution

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

Step 1 — Write the formula:

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

Step 2 — Substitute $V = 24$ V and $I = 3$ A:

$$R = \frac{24}{3}$$

Step 3 — Simplify:

$$R = 8\ \Omega$$

Why other options are wrong:

- Option A (72): multiplies voltage by current instead of dividing.
- Option B (27): adds voltage and current.
- Option D (0.125): inverts the ratio (current over voltage).

Final Answer: $8\ \Omega \Rightarrow$ C

Answer: (C) Go Back to Q16

Q17.

Solution

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

Step 1 — Find the total resistance:

$$R_{\text{total}} = 4 + 6 = 10\ \Omega$$

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

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

Step 3 — Substitute $V = 20$ V and $R_{\text{total}} = 10\ \Omega$:

$$I = \frac{20}{10}$$

Step 4 — Simplify:

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

Why other options are wrong:

- Option A (0.5): inverts the division.
- Option C (10): uses the resistance value as the current.
- Option D (5): uses only one resistor (4 Ω) instead of the total.

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

Answer: (B) Go Back to Q17

Q18.

Solution

Concept — Two equal resistors in parallel: For two equal resistors in parallel, the combined resistance is half the value of one resistor.

Step 1 — Write the parallel formula:

$$\frac{1}{R_{\text{p}}} = \frac{1}{R} + \frac{1}{R}$$

Step 2 — Substitute $R = 8\ \Omega$:

$$\frac{1}{R_{\text{p}}} = \frac{1}{8} + \frac{1}{8} = \frac{2}{8}$$

Step 3 — Invert to find R_{p}:

$$R_{\text{p}} = \frac{8}{2} = 4\ \Omega$$

Why other options are wrong:

- Option B (16): adds the resistors as if in series.
- Option C (8): leaves a single resistor value.
- Option D (2): halves the value twice.

Final Answer: $4\ \Omega \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q18

Q19.

Solution

Concept — Power from voltage and resistance: The power dissipated in a resistor can be written as $P = V^2/R$.

Step 1 — Write the formula:

$$P = \frac{V^2}{R}$$

Step 2 — Substitute $V = 20$ V and $R = 10\ \Omega$:

$$P = \frac{(20)^2}{10}$$

Step 3 — Evaluate the square:

$$(20)^2 = 400$$

Step 4 — Divide:

$$P = \frac{400}{10} = 40 \text{ W}$$

Why other options are wrong:

- Option A (2): divides voltage by resistance without squaring.
- Option B (200): multiplies V by R instead of using V^2/R.
- Option C (4): squares V/R instead of computing V^2/R.

Final Answer: 40 W $\Rightarrow$ D

Answer: (D) Go Back to Q19

Q20.

Solution

Concept — EMF of a cell: The electromotive force (EMF) is the potential difference across the cell's terminals when it is on open circuit, that is, when no current is being drawn from it.

Step 1 — Recall the definition: EMF is the energy supplied by the cell per unit charge; on open circuit there is no internal voltage drop, so the terminal PD equals

the EMF.

Step 2 — Match to the option: "Potential difference across its terminals when no current is drawn" is exactly the EMF.

Why other options are wrong:

- Option A (current it can deliver): current depends on the external circuit, not the EMF alone.
- Option C (electrolyte resistance): that is the internal resistance, a different quantity.
- Option D (stored charge): describes a capacitor, not a cell's EMF.

Final Answer: terminal PD with no current $\Rightarrow$ B

Answer: (B) Go Back to Q20

Q21.

Solution

Concept — Energy conversion in a microphone: A microphone is a transducer that converts sound energy (pressure waves in air) into a corresponding electrical signal.

Step 1 — Identify the energy conversion required: Input is sound; output is an electrical signal.

Step 2 — Match to the device: The device that performs sound $\rightarrow$ electrical conversion is the microphone.

Why other options are wrong:

- Option A (Loudspeaker): does the reverse, electrical $\rightarrow$ sound.
- Option B (Electric motor): converts electrical energy into mechanical motion.
- Option D (Transformer): changes AC voltage levels, with no sound involved.

Final Answer: Microphone $\Rightarrow$ C

Answer: (C) Go Back to Q21

Q22.

Solution

Concept — Strength of an electromagnet: The magnetic strength of an electromagnet increases with the current in the coil, the number of turns of the coil, and the use of a soft-iron core.

Step 1 — Recall the controlling factors: Field strength $\propto$ (number of turns) $\times$ (current), and is greatly enhanced by a soft-iron core.

Step 2 — Select the correct action: Increasing both the current and the number of turns increases the strength.

Why other options are wrong:

- Option A (decrease current): weakens the magnet.
- Option B (fewer turns): weakens the magnet.
- Option C (remove iron core): sharply reduces the field strength.

Final Answer: increase current and turns $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q22

Q23.

Solution

Concept — Full-wave vs half-wave rectification: A half-wave rectifier passes only one half of each AC cycle, whereas a full-wave rectifier inverts and uses both halves, delivering pulses for the whole cycle and a smoother DC output.

Step 1 — Recall half-wave behaviour: It conducts during one half-cycle only, leaving gaps in the output.

Step 2 — Compare with full-wave: The full-wave circuit makes use of both halves of each cycle, so the output has fewer gaps and is easier to smooth.

Why other options are wrong:

- Option B (only positive half): that describes a half-wave rectifier.
- Option C (no diodes): rectification needs diodes.
- Option D (AC output): a rectifier produces DC, not AC.

Final Answer: uses both halves, smoother DC $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q23

Q24.

Solution

Concept — DC sources: Direct current flows steadily in one direction. A battery (such as a dry cell) is a classic DC source; alternators and mains supplies produce alternating current.

Step 1 — Recall what produces steady one-direction current: Chemical cells and batteries push charge in a fixed direction, giving DC.

Step 2 — Match to the option: A dry cell (battery) is a DC source.

Why other options are wrong:

- Option A (mains socket): supplies AC.
- Option C (alternator): generates AC, as its name suggests.
- Option D (bicycle dynamo): a small alternator, producing AC.

Final Answer: dry cell (battery) $\Rightarrow$ B

Answer: (B) Go Back to Q24

Q25.

Solution

Concept — Engine instruments: The oil pressure gauge displays the pressure of the engine's lubricating oil, warning the pilot of a lubrication failure before damage occurs.

Step 1 — Match the function to the instrument: Showing lubricating-oil pressure is the job of the oil pressure gauge.

Step 2 — Confirm its importance: A sudden drop in oil pressure indicates a serious engine problem requiring immediate action.

Why other options are wrong:

- Option A (Altimeter): shows height above sea level.
- Option B (Airspeed indicator): shows speed through the air.
- Option D (Magnetic compass): shows heading or direction.

Final Answer: Oil pressure gauge $\Rightarrow$ C

Answer: (C) Go Back to Q25

Q26.

Solution

Concept — Fuselage structure: Stringers (also called longerons) are slender members that run lengthwise along the fuselage; together with the frames they support and stiffen the skin.

Step 1 — Identify the marked members: The long members running front to back along the body are the stringers/longerons.

Step 2 — Confirm their role: They carry much of the bending load along the fuselage and prevent the thin skin from buckling.

Why other options are wrong:

- Option A (Ribs): shape the wing aerofoil, not the fuselage length.
- Option B (Ailerons): movable control surfaces on the wing.
- Option C (Wing spars): main spanwise members of the wing, not lengthwise fuselage members.

Final Answer: Stringers (longerons) $\Rightarrow$ D

Answer: (D) Go Back to Q26

Q27.

Solution

Concept — Vertical stabilizer (fin): The vertical stabilizer, or fin, is the fixed vertical tail surface that provides directional (weathercock) stability, keeping the aircraft pointing into the relative wind about its vertical axis.

Step 1 — Identify the axis of stability: Directional stability is about the vertical (yaw) axis.

Step 2 — Match the surface: The fixed vertical tail surface that gives this stability is the vertical stabilizer (fin).

Why other options are wrong:

- Option B (Aileron): a movable surface on the wing, controls roll.
- Option C (Horizontal stabilizer): the horizontal tail surface, gives pitch stability.
- Option D (Flap): a high-lift device on the wing, not a tail surface.

Final Answer: Vertical stabilizer (fin) $\Rightarrow$ A

Answer: (A) Go Back to Q27

Q28.

Solution

Concept — Relative wind: The relative wind (relative airflow) is the airflow created by the aircraft's motion through the air; it strikes the aerofoil from a direction exactly opposite to the aerofoil's direction of motion.

Step 1 — Relate motion and airflow: If the aerofoil moves to the right, the air appears to flow to the left over it.

Step 2 — State the direction: Hence the relative wind is directed opposite to the aerofoil's motion.

Why other options are wrong:

- Option A (same direction as motion): then the air would not flow over the wing.
- Option C (vertically upward): the relative wind follows the motion, not a fixed vertical line.
- Option D (vertically downward): also incorrect for the same reason.

Final Answer: opposite to the motion $\Rightarrow$ B

Answer: (B) Go Back to Q28

Q29.

Solution

Concept — Direction of lift: By definition, lift is the component of the total aerodynamic force that acts perpendicular (at right angles) to the relative wind; the component parallel to the relative wind is drag.

Step 1 — Split the aerodynamic force: The air's force on the wing is resolved into two parts relative to the airflow.

Step 2 — Identify lift: The part at right angles to the relative wind is the lift.

Why other options are wrong:

- Option A (along the relative wind): that direction is drag, not lift.
- Option B (opposite to the relative wind): again the drag axis, not lift.
- Option C (straight down to earth): describes weight, not lift.

Final Answer: perpendicular to the relative wind $\Rightarrow$ D

Answer: (D) Go Back to Q29

Q30.

Solution

Concept — Environmental control system: The environmental control (air-conditioning) system supplies conditioned air to the cabin, providing both cooling and heating so the temperature stays comfortable for the occupants.

Step 1 — Identify the function needed: Keeping cabin air at a comfortable temperature (cooling and heating) is an air-conditioning task.

Step 2 — Match to the system: The environmental control (air-conditioning) system performs this function.

Why other options are wrong:

- Option B (Fuel system): stores and delivers fuel to the engines.
- Option C (Ignition system): starts and sustains combustion in the engine.
- Option D (Hydraulic system): powers heavy mechanisms such as landing gear and brakes.

Final Answer: Environmental control (air-conditioning) system $\Rightarrow$ A

Answer: (A) Go Back to Q30

Answer Key

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