AME CET Technical Aptitude

Sample Paper – 4

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. Two forces act on a body of mass 3 kg along the same line: 20 N pushing forward and 8 N opposing it. The acceleration of the body is:

(A) 9.3 m/s^2

(B) 6 m/s^2

(C) 4 m/s^2

(D) 28 m/s^2

Q2. A gun of mass 2 kg fires a bullet of mass 0.02 kg with a velocity of 100 m/s. By conservation of momentum, the recoil velocity of the gun is:

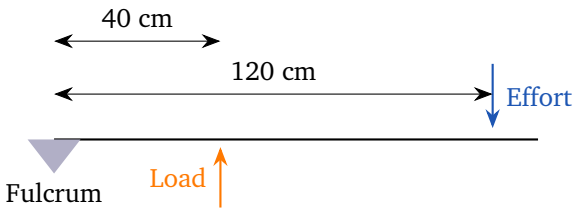
(A) 100 m/s

(B) 1 m/s

(C) 2 m/s

(D) 0.02 m/s

Q3. In the class-2 lever (wheelbarrow type) shown, the effort arm is 120 cm and the load arm is 40 cm, both measured from the fulcrum. The ideal mechanical advantage is:



(A) 0.33

(B) 160

(C) 80

(D) 3

Q4. A boy carries a suitcase of weight 60 N while walking 10 m horizontally along a level platform. The work done by him against gravity is:

(A) 0 J

(B) 600 J

(C) 60 J

(D) 70 J

Q5. The power rating of a motor is 2.5 kW. Expressed in watts, this is:

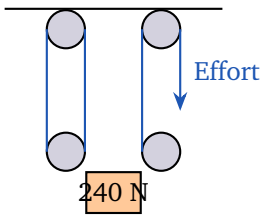
(A) 250 W

(B) 25 W

(C) 2.5 W

(D) 2500 W

Q6. A block-and-tackle system has 4 supporting strands of rope, as shown (ideal, frictionless). To lift a load of 240 N, the effort required is:



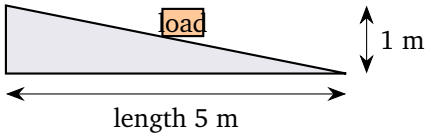
(A) 960 N

(B) 240 N

(C) 60 N

(D) 120 N

Q7. An inclined plane of length 5 m is used to raise a load to a vertical height of 1 m, as shown. The ideal mechanical advantage of the inclined plane is:



(A) 0.2

(B) 6

(C) 4

(D) 5

Q8. A force of 600 N acts normally on a metal rod of cross-sectional area 2×10^{-4} m^2. The stress developed in the rod is:

(A) 3×10^{6} Pa

(B) 3×10^{4} Pa

(C) 0.12 Pa

(D) 3×10^{8} Pa

Q9. The property of a material that enables it to resist scratching, abrasion or indentation is called:

(A) Ductility

(B) Malleability

(C) Hardness

(D) Density

Q10. The SI unit of power is the:

(A) Joule

(B) Newton

(C) Pascal

(D) Watt

Q11. A length is measured as 250 mm. Expressed in metres, this is:

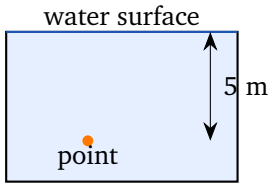
(A) 2.5 m

(B) 0.25 m

(C) 25 m

(D) 0.025 m

Q12. A point lies at a depth of 5 m below the free surface of water, as shown. Taking $\rho = 1000$ kg/m^3 and $g = 10$ m/s^2, the pressure due to the water column at that point is:



(A) 5000 Pa

(B) 500 Pa

(C) 50000 Pa

(D) 200 Pa

Q13. A solid object placed in a liquid will float if its average density is:

(A) greater than that of the liquid

(B) less than that of the liquid

(C) exactly zero

(D) equal to its own weight

Q14. When a metal railway track is heated by the sun, it tends to:

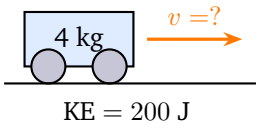
(A) expand and increase in length

(B) contract and decrease in length

(C) lose all its mass

(D) change into a liquid

Q15. A trolley of mass 4 kg has a kinetic energy of 200 J while moving, as shown. Its speed is:



(A) 100 m/s

(B) 50 m/s

(C) 25 m/s

(D) 10 m/s

Part B: Electrical, Electronics & Aviation Technical Fundamentals

Q16. A current of 3 A flows through a resistor of 4 Ω. The voltage across the resistor is:

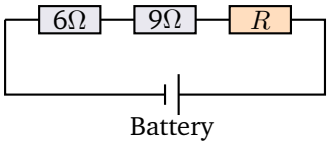
(A) 7 V

(B) 12 V

(C) 1.33 V

(D) 0.75 V

Q17. Three resistors are connected in series, as shown. The known values are 6 Ω and 9 Ω, and the measured total resistance is 20 Ω. The value of the unknown resistor R is:



(A) 5 Ω

(B) 35 Ω

(C) 15 Ω

(D) 14 Ω

Q18. Two resistors, each of 4 Ω, are connected in parallel. Their combined resistance is:

(A) 8 Ω

(B) 4 Ω

(C) 2 Ω

(D) 16 Ω

Q19. A current of 2 A flows through a 5 Ω resistor. The power dissipated in the resistor is:

(A) 10 W

(B) 7 W

(C) 2.5 W

(D) 20 W

Q20. A cell of EMF 2 V has an internal resistance of 1 Ω. When it delivers a current of 0.5 A, its terminal voltage is:

(A) 2.5 V

(B) 2 V

(C) 1.5 V

(D) 0.5 V

Q21. The electronic device that converts alternating current (AC) into direct current (DC) is the:

(A) Rectifier

(B) Inverter

(C) Transformer

(D) Amplifier

Q22. Faraday's law of electromagnetic induction states that an EMF is induced in a coil whenever there is a change in the:

(A) colour of the wire

(B) magnetic flux linked with the coil

(C) length of the coil only

(D) resistance of the coil

Q23. A light-emitting diode (LED) emits light when it is:

(A) reverse biased

(B) kept unconnected

(C) heated strongly

(D) forward biased

Q24. For a sinusoidal alternating current, the root-mean-square (RMS) value is related to the peak value I_0 by:

(A) $I_{\text{rms}} = I_0$

(B) $I_{\text{rms}} = 2I_0$

(C) $I_{\text{rms}} = 0$

(D) $I_{\text{rms}} = \dfrac{I_0}{\sqrt{2}}$

Q25. The cockpit instrument that shows the rate at which an aircraft is climbing or descending is the:

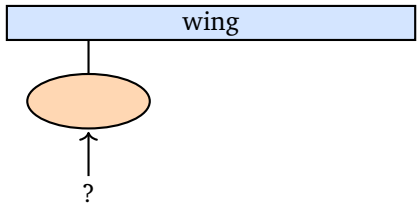
(A) Altimeter

(B) Airspeed indicator

(C) Vertical speed indicator

(D) Magnetic compass

Q26. In the simplified wing-and-engine outline shown, the streamlined housing that encloses the engine and is mounted under the wing is called the:



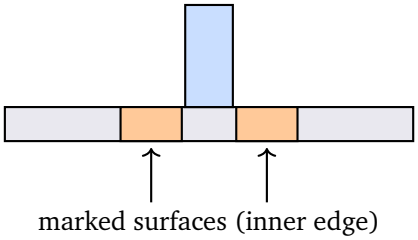
(A) Nacelle

(B) Fuselage

(C) Empennage

(D) Aileron

Q27. The control surfaces marked on the inner trailing edge of the wings in the figure are extended downward during take-off and landing to increase both lift and drag at low speed. These surfaces are the:



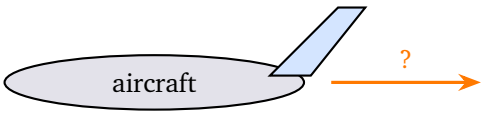
(A) Ailerons

(B) Flaps

(C) Rudder

(D) Elevator

Q28. The forward-acting force shown on the aircraft, produced by the engines and propelling it through the air, is called:



(A) Drag

(B) Weight

(C) Thrust

(D) Lift

Q29. In steady level flight, the upward force of lift is balanced by which downward force?

(A) Weight

(B) Thrust

(C) Drag

(D) Friction

Q30. The aircraft system that supplies electrical power for lighting, avionics and instruments, using generators and batteries, is the:

(A) Hydraulic system

(B) Electrical system

(C) Oxygen system

(D) Fuel system

Detailed Solutions

Q1.

Solution

Concept — Newton's second law with a net force: When two forces act along the same line, first find the net force, then divide by the mass, $a = F_{\text{net}}/m$.

Step 1 — Find the net force:

$$F_{\text{net}} = 20 - 8$$

Step 2 — Simplify:

$$F_{\text{net}} = 12 \text{ N}$$

Step 3 — Apply $a = F_{\text{net}}/m$ with $m = 3$ kg:

$$a = \frac{12}{3}$$

Step 4 — Simplify:

$$a = 4 \text{ m/s}^2$$

Why other options are wrong:

- Option A (9.3): divides 28 by 3, i.e. adds the forces instead of subtracting.
- Option B (6): divides only the 20 N force, ignoring the opposing 8 N.
- Option D (28): adds the two forces and forgets to divide by the mass.

Final Answer: $4 \text{ m/s}^2 \Rightarrow$ C

Answer: (C) Go Back to Q1

Q2.

Solution

Concept — Conservation of momentum (recoil): Before firing the total momentum is zero, so the forward momentum of the bullet equals the backward momentum of the gun, $m_g v_g = m_b v_b$.

Step 1 — Write the balance:

$$m_g v_g = m_b v_b$$

Step 2 — Substitute $m_g = 2$ kg, $m_b = 0.02$ kg, $v_b = 100$ m/s:

$$2 \times v_g = 0.02 \times 100$$

Step 3 — Evaluate the right side:

$$2 \times v_g = 2$$

Step 4 — Solve for v_g:

$$v_g = \frac{2}{2} = 1 \text{ m/s}$$

Why other options are wrong:

- Option A (100): uses the bullet's speed as the gun's speed, ignoring the mass ratio.
- Option C (2): stops at the bullet's momentum without dividing by the gun's mass.
- Option D (0.02): uses the bullet's mass as a speed.

Final Answer: 1 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 equals the effort arm divided by the load arm, regardless of the lever class.

Step 1 — Write the formula:

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

Step 2 — Substitute effort arm $= 120$ cm and load arm $= 40$ cm:

$$\text{MA} = \frac{120}{40}$$

Step 3 — Simplify:

$$\text{MA} = 3$$

Why other options are wrong:

- Option A (0.33): inverts the ratio (load arm over effort arm).
- Option B (160): adds the two arm lengths.
- Option C (80): subtracts the arm lengths.

Final Answer: 3 $\Rightarrow$ D

Answer: (D) Go Back to Q3

Q4.

Solution

Concept — Work and the direction of force: Work against gravity is done only when the load is raised. When motion is horizontal, the displacement is perpendicular to gravity, so the work done against gravity is zero.

Step 1 — Identify the directions: Gravity (and the weight 60 N) acts vertically downward, while the suitcase moves horizontally.

Step 2 — Apply the work relation:

$$W = F \times d \times \cos\theta, \quad \theta = 90^\circ$$

Step 3 — Evaluate:

$$\cos 90^\circ = 0 \;\Rightarrow\; W = 0 \text{ J}$$

Why other options are wrong:

- Option B (600): multiplies weight by horizontal distance, ignoring the perpendicular directions.
- Option C (60): just states the weight, not work.
- Option D (70): adds weight and distance.

Final Answer: 0 J $\Rightarrow$ A

Answer: (A) Go Back to Q4

Q5.

Solution

Concept — Unit conversion (kilowatt to watt): The prefix "kilo" means one thousand, so $1\ \text{kW} = 1000\ \text{W}$.

Step 1 — Write the conversion factor:

$$1\ \text{kW} = 1000\ \text{W}$$

Step 2 — Multiply the rating by 1000:

$$2.5\ \text{kW} = 2.5 \times 1000\ \text{W}$$

Step 3 — Simplify:

$$2.5 \times 1000 = 2500\ \text{W}$$

Why other options are wrong:

- Option A (250): multiplies by 100 instead of 1000.
- Option B (25): multiplies by 10 only.
- Option C (2.5): leaves the value unconverted.

Final Answer: $2500\ \text{W} \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q5

Q6.

Solution

Concept — Block-and-tackle pulley: In an ideal block-and-tackle, the mechanical advantage equals the number of rope strands supporting the load, so the effort is the load divided by that number.

Step 1 — State the mechanical advantage:

$$\text{MA} = \text{number of supporting strands} = 4$$

Step 2 — Relate effort and load:

$$\text{Effort} = \frac{\text{Load}}{\text{MA}} = \frac{240}{4}$$

Step 3 — Simplify:

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

Why other options are wrong:

- Option A (960): multiplies the load by 4 instead of dividing.
- Option B (240): assumes no mechanical advantage.
- Option D (120): divides by 2 instead of 4.

Final Answer: 60 N $\Rightarrow$ C

Answer: (C) Go Back to Q6

Q7.

Solution

Concept — Inclined plane mechanical advantage: For an ideal inclined plane the mechanical advantage equals the length of the slope divided by the vertical height.

Step 1 — Write the formula:

$$\text{MA} = \frac{\text{length}}{\text{height}}$$

Step 2 — Substitute length $= 5$ m and height $= 1$ m:

$$\text{MA} = \frac{5}{1}$$

Step 3 — Simplify:

$$\text{MA} = 5$$

Why other options are wrong:

- Option A (0.2): inverts the ratio (height over length).
- Option B (6): adds the length and height.
- Option C (4): subtracts the height from the length.

Final Answer: 5 $\Rightarrow$ D

Answer: (D) Go Back to Q7

Q8.

Solution

Concept — Stress: Stress is the force per unit cross-sectional area, $\sigma = F/A$.

Step 1 — Write the formula:

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

Step 2 — Substitute $F = 600$ N and $A = 2 \times 10^{-4}$ m^2:

$$\sigma = \frac{600}{2 \times 10^{-4}}$$

Step 3 — Divide the numbers:

$$\frac{600}{2} = 300$$

Step 4 — Apply the power of ten:

$$\sigma = 300 \times 10^{4} = 3 \times 10^{6} \text{ Pa}$$

Why other options are wrong:

- Option B (3×10^{4}): off by a factor of 100 in the area exponent.
- Option C (0.12): multiplies instead of divides by the area.
- Option D (3×10^{8}): uses too large a power of ten.

Final Answer: 3×10^{6} Pa $\Rightarrow$ A

Answer: (A) Go Back to Q8

Q9.

Solution

Concept — Mechanical properties of materials: Hardness is the resistance of a material to scratching, abrasion or indentation by another body.

Step 1 — Match the definition: "Resists scratching, abrasion or indentation" is the defining description of hardness.

Step 2 — Confirm the property: Materials such as hardened steel and diamond have high hardness, which is why they are used as cutting and abrasive tools.

Why other options are wrong:

- Option A (Ductility): the ability to be drawn into wires, not to resist scratching.
- Option B (Malleability): the ability to be hammered into thin sheets.
- Option D (Density): mass per unit volume, unrelated to surface resistance.

Final Answer: Hardness $\Rightarrow$ C

Answer: (C) Go Back to Q9

Q10.

Solution

Concept — SI units: Power is the rate of doing work, and its SI unit is the watt (W), equal to one joule per second.

Step 1 — Recall the definition of power:

$$\text{Power} = \frac{\text{Work}}{\text{Time}} = \frac{\text{J}}{\text{s}}$$

Step 2 — Name the unit:

$$1\ \frac{\text{J}}{\text{s}} = 1 \text{ watt (W)}$$

Why other options are wrong:

- Option A (Joule): the unit of work or energy, not power.
- Option B (Newton): the unit of force.
- Option C (Pascal): the unit of pressure.

Final Answer: Watt $\Rightarrow$ D

Answer: (D) Go Back to Q10

Q11.

Solution

Concept — Length conversion (millimetres to metres): There are 1000 millimetres in one metre, so to convert mm to m we divide by 1000.

Step 1 — Write the conversion factor:

$$1 \text{ m} = 1000 \text{ mm}$$

Step 2 — Divide the measured length by 1000:

$$250 \text{ mm} = \frac{250}{1000} \text{ m}$$

Step 3 — Simplify:

$$\frac{250}{1000} = 0.25 \text{ m}$$

Why other options are wrong:

- Option A (2.5): divides by 100 instead of 1000.
- Option C (25): divides by 10 only.
- Option D (0.025): divides by 10000, one factor of ten too many.

Final Answer: 0.25 m $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q11

Q12.

Solution

Concept — Pressure due to a liquid column: The pressure at a depth h in a liquid is $P = \rho g h$, where ρ is the density and g the acceleration due to gravity.

Step 1 — Write the formula:

$$P = \rho g h$$

Step 2 — Substitute $\rho = 1000$, $g = 10$, $h = 5$:

$$P = 1000 \times 10 \times 5$$

Step 3 — Multiply step by step:

$$1000 \times 10 = 10000$$

$$10000 \times 5 = 50000 \text{ Pa}$$

Why other options are wrong:

- Option A (5000): drops a factor of ten in the calculation.
- Option B (500): drops two factors of ten.
- Option D (200): multiplies the wrong quantities together.

Final Answer: 50000 Pa $\Rightarrow$ C

Answer: (C) Go Back to Q12

Q13.

Solution

Concept — Floating and sinking: An object floats when its average density is less than the density of the liquid, so that the upthrust can support its weight.

Step 1 — Recall the condition: If the average density of the object is less than that of the liquid, it floats; if greater, it sinks.

Step 2 — Select the matching statement: "Less than that of the liquid" is the correct floating condition.

Why other options are wrong:

- Option A (greater): this causes the object to sink, not float.
- Option C (exactly zero): no real solid has zero density.
- Option D (equal to its own weight): density and weight are different quantities and cannot be "equal".

Final Answer: less than that of the liquid $\Rightarrow$ B

Answer: (B) Go Back to Q13

Q14.

Solution

Concept — Thermal expansion: Most solids expand when heated because their particles vibrate more vigorously and move slightly further apart, increasing the length of the object.

Step 1 — Recall the behaviour of metals on heating: Raising the temperature of a metal increases the average spacing between its atoms.

Step 2 — State the consequence for a rail: The track therefore expands and increases in length, which is why expansion gaps are left between rails.

Why other options are wrong:

- Option B (contract): solids contract on cooling, not on heating.
- Option C (lose mass): heating does not remove mass from a solid rail.
- Option D (turn liquid): sunlight is far too weak to melt steel rails.

Final Answer: expand and increase in length $\Rightarrow$ A

Answer: (A) Go Back to Q14

Q15.

Solution

Concept — Finding speed from kinetic energy: Starting from KE $= \frac{1}{2}mv^2$, the speed is $v = \sqrt{2\,\text{KE}/m}$.

Step 1 — Rearrange the formula for v:

$$v = \sqrt{\frac{2\,\text{KE}}{m}}$$

Step 2 — Substitute KE $= 200$ J and $m = 4$ kg:

$$v = \sqrt{\frac{2 \times 200}{4}}$$

Step 3 — Simplify inside the root:

$$\frac{2 \times 200}{4} = \frac{400}{4} = 100$$

Step 4 — Take the square root:

$$v = \sqrt{100} = 10 \text{ m/s}$$

Why other options are wrong:

- Option A (100): leaves the value as v^2 without taking the square root.
- Option B (50): divides 100 by 2 instead of taking its root.
- Option C (25): divides KE by mass and forgets the factor of 2 and the root.

Final Answer: 10 m/s $\Rightarrow$ D

Answer: (D) Go Back to Q15

Q16.

Solution

Concept — Ohm's law: The voltage across a resistor equals the current through it times its resistance, $V = IR$.

Step 1 — Write the formula:

$$V = IR$$

Step 2 — Substitute $I = 3$ A and $R = 4\ \Omega$:

$$V = 3 \times 4$$

Step 3 — Simplify:

$$V = 12\ \text{V}$$

Why other options are wrong:

- Option A (7): adds current and resistance.
- Option C (1.33): divides resistance by current.
- Option D (0.75): divides current by resistance.

Final Answer: $12\ \text{V} \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q16

Q17.

Solution

Concept — Resistors in series: In a series circuit the total resistance is the sum of the individual resistances, so an unknown resistor equals the total minus the known ones.

Step 1 — Write the series relation:

$$R_{\text{total}} = 6 + 9 + R$$

Step 2 — Add the two known resistors:

$$6 + 9 = 15$$

Step 3 — Substitute the total $= 20\ \Omega$:

$$20 = 15 + R$$

Step 4 — Solve for R:

$$R = 20 - 15 = 5\ \Omega$$

Why other options are wrong:

- Option B (35): adds the total to the known resistances instead of subtracting.
- Option C (15): gives only the sum of the two known resistors.
- Option D (14): subtracts only the 6 Ω resistor.

Final Answer: $5\ \Omega \Rightarrow$ A

Answer: (A) Go Back to Q17

Q18.

Solution

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

Step 1 — Write the parallel formula:

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

Step 2 — Substitute $R = 4\ \Omega$:

$$\frac{1}{R_p} = \frac{1}{4} + \frac{1}{4} = \frac{2}{4}$$

Step 3 — Invert to find R_p:

$$R_p = \frac{4}{2} = 2\ \Omega$$

Why other options are wrong:

- Option A (8): adds the resistors as if in series.
- Option B (4): leaves a single resistor value.
- Option D (16): multiplies the resistors together.

Final Answer: $2\ \Omega \Rightarrow$ C

Answer: (C) Go Back to Q18

Q19.

Solution

Concept — Power dissipated in a resistor: The power dissipated is $P = I^2R$.

Step 1 — Write the formula:

$$P = I^2R$$

Step 2 — Substitute $I = 2$ A and $R = 5\ \Omega$:

$$P = (2)^2 \times 5$$

Step 3 — Evaluate the square:

$$(2)^2 = 4$$

Step 4 — Compute:

$$P = 4 \times 5 = 20 \text{ W}$$

Why other options are wrong:

- Option A (10): uses $I \times R$ without squaring the current.
- Option B (7): adds current and resistance.
- Option C (2.5): divides resistance by current instead of multiplying.

Final Answer: 20 W $\Rightarrow$ D

Answer: (D) Go Back to Q19

Q20.

Solution

Concept — Terminal voltage of a cell: When a cell supplies current, some EMF is dropped across its internal resistance, so the terminal voltage is $V = E - Ir$.

Step 1 — Write the formula:

$$V = E - Ir$$

Step 2 — Substitute $E = 2$ V, $I = 0.5$ A, $r = 1\ \Omega$:

$$V = 2 - (0.5 \times 1)$$

Step 3 — Evaluate the internal drop:

$$0.5 \times 1 = 0.5$$

Step 4 — Subtract:

$$V = 2 - 0.5 = 1.5 \text{ V}$$

Why other options are wrong:

- Option A (2.5): adds the internal drop instead of subtracting it.
- Option B (2): ignores the internal resistance drop.
- Option D (0.5): gives only the internal drop, not the terminal voltage.

Final Answer: 1.5 V $\Rightarrow$ C

Answer: (C) Go Back to Q20

Q21.

Solution

Concept — Rectifier: A rectifier uses diodes to allow current in one direction only, converting alternating current (AC) into direct current (DC).

Step 1 — Identify the conversion required: The device must take AC as input and produce DC as output.

Step 2 — Match to the device: The component that performs AC $\rightarrow$ DC conversion is the rectifier.

Why other options are wrong:

- Option B (Inverter): does the reverse, converting DC into AC.
- Option C (Transformer): only changes AC voltage levels, it does not convert AC to DC.
- Option D (Amplifier): increases signal strength, it does not change AC to DC.

Final Answer: Rectifier $\Rightarrow$ A

Answer: (A) Go Back to Q21

Q22.

Solution

Concept — Faraday's law of induction: An EMF is induced in a coil whenever the magnetic flux linked with it changes; the larger and faster the change in flux, the larger the induced EMF.

Step 1 — Recall the law: Induced EMF is proportional to the rate of change of magnetic flux through the coil.

Step 2 — Select the matching cause: The required change is a change in the magnetic flux linked with the coil.

Why other options are wrong:

- Option A (colour of the wire): has no effect on induced EMF.
- Option C (length only): length alone does not induce an EMF without a changing flux.
- Option D (resistance): resistance affects current, not the induced EMF itself.

Final Answer: magnetic flux linked with the coil $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q22

Q23.

Solution

Concept — Light-emitting diode: An LED is a diode that gives out light when current passes through it in the forward direction, i.e. when it is forward biased.

Step 1 — Recall diode conduction: A diode conducts current only when forward biased.

Step 2 — Relate conduction to light: The LED emits light only while this forward current flows, so it lights up when forward biased.

Why other options are wrong:

- Option A (reverse biased): the LED blocks current and stays dark.
- Option B (unconnected): no current flows, so no light.
- Option C (heated strongly): heating can damage it but does not make it emit useful light.

Final Answer: forward biased $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q23

Q24.

Solution

Concept — RMS value of AC: For a sinusoidal alternating current the root-mean-square value is the peak value divided by $\sqrt{2}$ (about 0.707 times the peak).

Step 1 — Recall the relation:

$$I_{\text{rms}} = \frac{I_0}{\sqrt{2}}$$

Step 2 — Interpret it: The RMS value is the steady (DC) current that would produce the same heating, and it is always less than the peak.

Why other options are wrong:

- Option A ($I_{\text{rms}} = I_0$): the RMS value is smaller than the peak, not equal.
- Option B ($2I_0$): the RMS value cannot exceed the peak.
- Option C (0): a non-zero AC has a non-zero RMS value.

Final Answer: $I_{\text{rms}} = I_0/\sqrt{2} \Rightarrow$ D

Answer: (D) Go Back to Q24

Q25.

Solution

Concept — Flight instruments: The vertical speed indicator (VSI) shows how fast the aircraft is climbing or descending, in feet per minute.

Step 1 — Match the function to the instrument: Indicating the rate of climb or descent is the job of the vertical speed indicator.

Step 2 — Confirm the principle: It senses the rate of change of static air pressure as altitude changes.

Why other options are wrong:

- Option A (Altimeter): shows the absolute height, not the rate of change.
- Option B (Airspeed indicator): shows speed through the air, not vertical rate.
- Option D (Magnetic compass): shows heading or direction.

Final Answer: Vertical speed indicator $\Rightarrow$ C

Answer: (C) Go Back to Q25

Q26.

Solution

Concept — Aircraft structure: The nacelle is the streamlined housing that encloses an aircraft engine and is usually mounted on or under the wing.

Step 1 — Identify the marked part: The pod-shaped housing under the wing that holds the engine is the nacelle.

Step 2 — Confirm its role: It streamlines the engine to reduce drag and protects it from the airflow.

Why other options are wrong:

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

Final Answer: Nacelle $\Rightarrow$ A

Answer: (A) Go Back to Q26

Q27.

Solution

Concept — High-lift devices: Flaps are hinged surfaces on the inner trailing edge of each wing that are lowered during take-off and landing to increase both lift and drag at low speeds.

Step 1 — Identify the function described: Increasing lift and drag for low-speed take-off and landing is the role of flaps.

Step 2 — Match to the location: The marked surfaces are on the inner trailing edge of the wings, which is where flaps are fitted.

Why other options are wrong:

- Option A (Ailerons): on the outer trailing edge, they roll the aircraft, not add lift for landing.
- Option C (Rudder): on the vertical tail, controls yaw.
- Option D (Elevator): on the horizontal tail, controls pitch.

Final Answer: Flaps $\Rightarrow$ B

Answer: (B) Go Back to Q27

Q28.

Solution

Concept — Four forces of flight: Thrust is the forward force produced by the engines (propeller or jet) that propels the aircraft through the air and opposes drag.

Step 1 — Identify the direction of the marked force: The arrow points forward, in the aircraft's direction of travel.

Step 2 — Match to the force: The forward force generated by the engines is thrust.

Why other options are wrong:

- Option A (Drag): acts backward, opposing motion.
- Option B (Weight): acts vertically downward.
- Option D (Lift): acts upward, perpendicular to the flight path.

Final Answer: Thrust $\Rightarrow$ C

Answer: (C) Go Back to Q28

Q29.

Solution

Concept — Four forces of flight: In steady level flight the forces balance in pairs: lift (up) balances weight (down), and thrust (forward) balances drag (backward).

Step 1 — Identify the vertical pair: Lift acts upward and weight acts downward.

Step 2 — State the balance: For level flight, the upward lift is balanced by the downward weight.

Why other options are wrong:

- Option B (Thrust): a forward horizontal force, balanced by drag.
- Option C (Drag): a backward horizontal force, not vertical.
- Option D (Friction): not one of the four primary forces of flight.

Final Answer: Weight $\Rightarrow$ A

Answer: (A) Go Back to Q29

Q30.

Solution

Concept — Aircraft electrical system: The electrical system uses engine-driven generators (or alternators) and batteries to supply power for lighting, avionics and instruments.

Step 1 — Identify the function needed: Powering lights, avionics and instruments requires a source of electrical energy.

Step 2 — Match to the system: Generators and batteries are the heart of the aircraft electrical system, so this is the correct answer.

Why other options are wrong:

- Option A (Hydraulic system): uses pressurised fluid for gear and brakes, not electricity.
- Option C (Oxygen system): supplies breathing oxygen at altitude.
- Option D (Fuel system): stores and delivers fuel to the engines.

Final Answer: Electrical system $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) 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	D
6	C	7	D	8	A	9	C	10	D
11	B	12	C	13	B	14	A	15	D
16	B	17	A	18	C	19	D	20	C
21	A	22	B	23	D	24	D	25	C
26	A	27	B	28	C	29	A	30	B