AME CET Technical Aptitude

Sample Paper – 10

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 horizontal forces of 18 N and 6 N act in opposite directions on a body of mass 3 kg resting on a frictionless floor. The acceleration of the body is:

(A) 8 m/s^2

(B) 6 m/s^2

(C) 4 m/s^2

(D) 24 m/s^2

Q2. A ball of mass 0.5 kg moving at 8 m/s is brought to rest by a fielder in 0.2 s. The average force the fielder applies is:

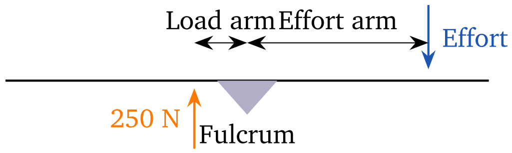
(A) 20 N

(B) 4 N

(C) 0.8 N

(D) 80 N

Q3. A class-1 lever has an ideal mechanical advantage of 5. The effort required to just lift a load of 250 N, as shown, is:



(A) 1250 N

(B) 50 N

(C) 245 N

(D) 255 N

Q4. A crate is pushed forward by a 60 N force while a friction force of 20 N opposes the motion. If the crate moves 5 m forward, the net work done on it is:

(A) 400 J

(B) 100 J

(C) 45 J

(D) 200 J

Q5. A conveyor motor does 4500 J of work in 15 seconds. The power output of the motor is:

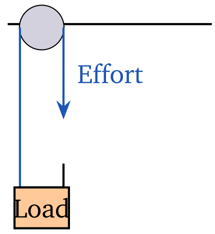
(A) 67500 W

(B) 300 W

(C) 30 W

(D) 4515 W

Q6. A single movable pulley (ideal) is used to raise a load through a height of 2 m, as shown. The length of rope the effort end must be pulled is:



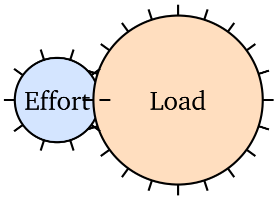
(A) 1 m

(B) 2 m

(C) 8 m

(D) 4 m

Q7. A simple machine has a velocity ratio of 40. Ignoring friction, the effort needed to raise a load of 800 N, as represented by the gear-and-screw arrangement shown, is:



(A) 20 N

(B) 32000 N

(C) 840 N

(D) 760 N

Q8. When a metal wire is stretched within its elastic limit, the work done by the stretching force is stored in the wire as:

(A) Heat energy that escapes immediately

(B) Elastic potential (strain) energy

(C) Kinetic energy of the wire

(D) Magnetic energy

Q9. The property of a metal that allows it to withstand chemical attack such as rusting and oxidation when exposed to the environment is called:

(A) Malleability

(B) Ductility

(C) Hardness

(D) Corrosion resistance

Q10. The SI unit of electric potential difference (voltage) is the:

(A) Ampere

(B) Ohm

(C) Volt

(D) Coulomb

Q11. A micrometer screw gauge has a pitch of 0.5 mm and 50 divisions on its circular (thimble) scale. Its least count is:

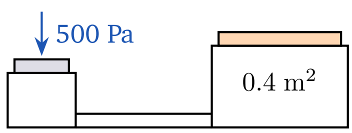
(A) 0.01 mm

(B) 0.05 mm

(C) 0.1 mm

(D) 0.5 mm

Q12. In the hydraulic system shown, a pressure of 500 Pa is applied to the small piston. By Pascal's law the pressure transmitted to the large piston (area 0.4 m^2) is:



(A) 200 Pa

(B) 500 Pa

(C) 1250 Pa

(D) 0 Pa

Q13. A steel ship floats on water even though steel is denser than water. The main reason is that:

(A) Steel becomes lighter when shaped into a hull

(B) Water pushes harder on heavier objects

(C) The ship is filled with helium gas

(D) Its hollow shape makes the ship's average density less than that of water

Q14. Taking 1 calorie $= 4.2$ joules, the energy equivalent of 50 calories is:

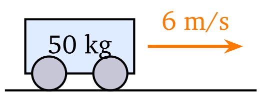
(A) 210 J

(B) 11.9 J

(C) 54.2 J

(D) 45.8 J

Q15. A loaded baggage trolley of mass 50 kg moves with a velocity of 6 m/s, as shown. Its kinetic energy is:



(A) 300 J

(B) 900 J

(C) 150 J

(D) 1800 J

Part B: Electrical, Electronics & Aviation Technical Fundamentals

Q16. A current of 4 A flows through a resistor of 7 Ω. The voltage across the resistor is:

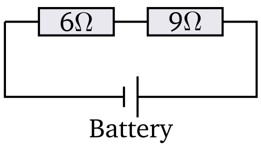
(A) 1.75 V

(B) 11 V

(C) 28 V

(D) 3 V

Q17. Two resistors of 6 Ω and 9 Ω are connected in series, as shown. The total resistance of the circuit is:



(A) 3.6 Ω

(B) 3 Ω

(C) 54 Ω

(D) 15 Ω

Q18. A 6 Ω resistor and a 12 Ω resistor are connected in parallel. Their combined resistance is:

(A) 4 Ω

(B) 18 Ω

(C) 9 Ω

(D) 2 Ω

Q19. An electric heater rated at 2 kW is used for 5 hours. If electricity costs Rs. 6 per kWh, the cost of running the heater is:

(A) Rs. 12

(B) Rs. 30

(C) Rs. 60

(D) Rs. 10

Q20. Six identical cells, each of EMF 1.5 V, are connected in series. The total EMF of the combination is:

(A) 1.5 V

(B) 0.25 V

(C) 4.5 V

(D) 9 V

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

(A) Electric motor

(B) Electric heater

(C) Generator

(D) Transformer

Q22. The magnetic field of a bar magnet is strongest:

(A) At the exact centre of the magnet

(B) Equally everywhere around the magnet

(C) At the two poles of the magnet

(D) Only outside the magnet, never near it

Q23. In an electrical circuit, the component that melts and breaks the circuit when the current becomes dangerously high is the:

(A) Capacitor

(B) Transformer

(C) Diode

(D) Fuse

Q24. In an aircraft electrical system, the device used to convert alternating current (AC) into direct current (DC) is called a:

(A) Rectifier

(B) Inverter

(C) Transformer

(D) Alternator

Q25. The gyroscopic cockpit instrument that shows the direction in which the aircraft's nose is pointing (its heading), and is set against the magnetic compass, is the:

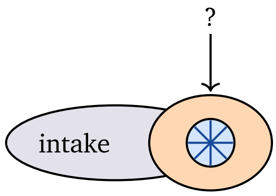
(A) Altimeter

(B) Heading indicator (directional gyro)

(C) Airspeed indicator

(D) Vertical speed indicator

Q26. In the simplified engine outline shown, the removable streamlined cover fitted around the engine to reduce drag and protect it is called the:



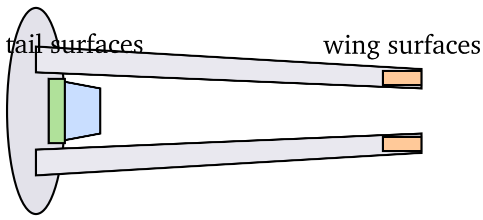
(A) Cowling

(B) Fuselage

(C) Aileron

(D) Spar

Q27. The figure shows two sets of control surfaces. The pair on the wing trailing edges produce roll, while the pair on the horizontal tail produce pitch. These two pairs are, respectively, the:



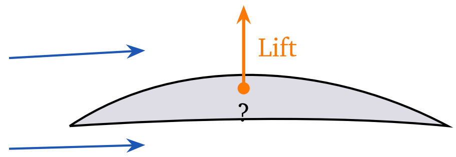
(A) Rudder and flaps

(B) Elevator and ailerons

(C) Flaps and rudder

(D) Ailerons and elevator

Q28. Air flows over the aerofoil shown, and the lift force can be treated as acting at a single point. The point on the aerofoil through which the total aerodynamic (lift) force is taken to act is called the:



(A) Leading edge

(B) Trailing edge

(C) Centre of pressure

(D) Wingtip

Q29. An aircraft flying straight and level will speed up (accelerate forward) when:

(A) Thrust is greater than drag

(B) Drag is greater than thrust

(C) Lift is greater than weight

(D) Weight is greater than lift

Q30. The aircraft engine system responsible for producing the spark that starts and sustains combustion of the fuel-air mixture is the:

(A) Hydraulic system

(B) Ignition system

(C) Fuel system

(D) Oxygen system

Detailed Solutions

Q1.

Solution

Concept — Newton's second law with a net force: When two forces act in opposite directions, the net force is their difference, and the acceleration is $a = F_{\text{net}}/m$.

Step 1 — Find the net force:

$$F_{\text{net}} = 18 - 6 = 12 \text{ N}$$

Step 2 — Write Newton's second law:

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

Step 3 — Substitute $F_{\text{net}} = 12$ N and $m = 3$ kg:

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

Step 4 — Simplify:

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

Why other options are wrong:

- Option A (8): divides the difference by 1.5 instead of 3.
- Option B (6): uses only the larger force divided by mass.
- Option D (24): adds the two forces instead of subtracting.

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

Answer: (C) Go Back to Q1

Q2.

Solution

Concept — Impulse-momentum (average force): The average force equals the change in momentum divided by the time taken, $F = \dfrac{m\,\Delta v}{t}$.

Step 1 — Write the formula:

$$F = \frac{m\,\Delta v}{t}$$

Step 2 — Find the change in velocity (8 m/s down to 0):

$$\Delta v = 8 - 0 = 8 \text{ m/s}$$

Step 3 — Substitute $m = 0.5$ kg, $\Delta v = 8$ m/s, $t = 0.2$ s:

$$F = \frac{0.5 \times 8}{0.2}$$

Step 4 — Simplify the numerator and divide:

$$F = \frac{4}{0.2} = 20 \text{ N}$$

Why other options are wrong:

- Option B (4): stops at $m\,\Delta v$ and forgets to divide by time.
- Option C (0.8): multiplies by time instead of dividing.
- Option D (80): uses $t = 0.05$ s by mistake.

Final Answer: 20 N $\Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q2

Q3.

Solution

Concept — Mechanical advantage of a lever: For an ideal lever, $\text{MA} = \frac{\text{Load}}{\text{Effort}}$, so the effort is the load divided by the mechanical advantage.

Step 1 — Rearrange for effort:

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

Step 2 — Substitute Load $= 250$ N and MA $= 5$:

$$\text{Effort} = \frac{250}{5}$$

Step 3 — Simplify:

$$\text{Effort} = 50 \text{ N}$$

Why other options are wrong:

- Option A (1250): multiplies load by MA instead of dividing.
- Option C (245): subtracts 5 from the load.
- Option D (255): adds 5 to the load.

Final Answer: 50 N $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q3

Q4.

Solution

Concept — Net work of several forces: The net work equals the net force in the direction of motion times the distance moved.

Step 1 — Find the net force along the motion:

$$F_{\text{net}} = 60 - 20 = 40 \text{ N}$$

Step 2 — Write the work formula:

$$W = F_{\text{net}} \times d$$

Step 3 — Substitute $F_{\text{net}} = 40$ N and $d = 5$ m:

$$W = 40 \times 5$$

Step 4 — Simplify:

$$W = 200 \text{ J}$$

Why other options are wrong:

- Option A (400): uses the 60 N force without subtracting friction, then doubles.
- Option B (100): multiplies the friction force by the distance only.
- Option C (45): adds the net force and the distance.

Final Answer: 200 J $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q4

Q5.

Solution

Concept — Power: Power is the rate of doing work, $P = W/t$.

Step 1 — Write the formula:

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

Step 2 — Substitute $W = 4500$ J and $t = 15$ s:

$$P = \frac{4500}{15}$$

Step 3 — Simplify:

$$P = 300 \text{ W}$$

Why other options are wrong:

- Option A (67500): multiplies work by time instead of dividing.
- Option C (30): divides by 150 instead of 15.
- Option D (4515): adds work and time.

Final Answer: 300 W $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q5

Q6.

Solution

Concept — Single movable pulley (velocity ratio): An ideal single movable pulley has a velocity ratio of 2, so the effort end of the rope moves twice the distance the load rises.

Step 1 — State the velocity ratio:

$$\text{VR} = 2$$

Step 2 — Relate the distances:

$$\text{Effort distance} = \text{VR} \times \text{Load distance}$$

Step 3 — Substitute load distance $= 2$ **m:**

$$\text{Effort distance} = 2 \times 2$$

Step 4 — Simplify:

$$\text{Effort distance} = 4 \text{ m}$$

Why other options are wrong:

- Option A (1): halves the load distance instead of doubling it.
- Option B (2): assumes the effort moves the same distance as the load.
- Option C (8): uses a velocity ratio of 4, which a single movable pulley does not give.

Final Answer: 4 m $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q6

Q7.

Solution

Concept — Velocity ratio of a frictionless machine: For an ideal (frictionless) machine, the mechanical advantage equals the velocity ratio, so Effort $= \frac{\text{Load}}{\text{VR}}$.

Step 1 — Write the relation:

$$\text{Effort} = \frac{\text{Load}}{\text{VR}}$$

Step 2 — Substitute Load $= 800$ **N and VR** $= 40$**:**

$$\text{Effort} = \frac{800}{40}$$

Step 3 — Simplify:

$$\text{Effort} = 20 \text{ N}$$

Why other options are wrong:

- Option B (32000): multiplies load by velocity ratio instead of dividing.
- Option C (840): adds the velocity ratio to the load.
- Option D (760): subtracts the velocity ratio from the load.

Final Answer: 20 N ⇒ A

Answer: (A) Go Back to Q7

Q8.

Solution

Concept — Strain energy: Work done in stretching a wire within its elastic limit is stored as elastic potential energy, which is released when the wire returns to its original length.

Step 1 — Identify what happens to the work: The stretching force does work against the internal elastic forces of the wire.

Step 2 — Name the stored energy: Because the deformation is elastic and reversible, this energy is stored as elastic potential (strain) energy.

Why other options are wrong:

- Option A (Heat): heat is generated only beyond the elastic limit or in repeated cycling, not in ideal elastic stretching.
- Option C (Kinetic energy): the wire is stretched slowly and is not moving, so it has no kinetic energy.
- Option D (Magnetic energy): stretching a wire involves no magnetic field.

Final Answer: Elastic potential (strain) energy ⇒ B

Answer: (B) Go Back to Q8

Q9.

Solution

Concept — Corrosion resistance: Corrosion resistance is the ability of a metal to resist chemical attack, such as rusting and oxidation, when exposed to air, moisture or chemicals.

Step 1 — Match the definition: "Withstand chemical attack such as rusting and oxidation" is the defining description of corrosion resistance.

Step 2 — Confirm the property: Metals such as stainless steel and aluminium form a protective oxide layer, giving them good corrosion resistance.

Why other options are wrong:

- Option A (Malleability): the ability to be beaten into sheets, not chemical resistance.

- Option B (Ductility): the ability to be drawn into wires.
- Option C (Hardness): resistance to scratching or indentation, not to corrosion.

Final Answer: Corrosion resistance $\Rightarrow \boxed{\text{D}}$

Answer: (D) **Go Back to Q9**

Q10.

Solution

Concept — SI units: Electric potential difference (voltage) is the work done per unit charge, and its SI unit is the volt (V).

Step 1 — Recall the definition of voltage:

$$\text{Voltage} = \frac{\text{Work done}}{\text{Charge}} = \frac{\text{joule}}{\text{coulomb}}$$

Step 2 — Name the unit:

$$1\,\frac{\text{J}}{\text{C}} = 1 \text{ volt (V)}$$

Why other options are wrong:

- Option A (Ampere): the unit of electric current.
- Option B (Ohm): the unit of electrical resistance.
- Option D (Coulomb): the unit of electric charge.

Final Answer: Volt $\Rightarrow \boxed{\text{C}}$

Answer: (C) **Go Back to Q10**

Q11.

Solution

Concept — Least count of a micrometer: The least count is the pitch divided by the number of divisions on the circular (thimble) scale.

Step 1 — Write the formula:

$$\text{Least count} = \frac{\text{pitch}}{\text{number of thimble divisions}}$$

Step 2 — Substitute pitch $= 0.5$ mm and 50 divisions:

$$\text{Least count} = \frac{0.5}{50}$$

Step 3 — Simplify:

$$\text{Least count} = 0.01 \text{ mm}$$

Why other options are wrong:

- Option B (0.05): divides by 10 instead of 50.
- Option C (0.1): divides the pitch by 5.
- Option D (0.5): takes the pitch itself as the least count.

Final Answer: 0.01 mm $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q11

Q12.

Solution

Concept — Pascal's law: Pressure applied to an enclosed, incompressible fluid is transmitted equally and undiminished to every point of the fluid, so the pressure on the large piston equals the pressure applied on the small piston.

Step 1 — State Pascal's law: The transmitted pressure is the same throughout the fluid, regardless of piston area.

Step 2 — Apply it to the given pressure:

$$P_{\text{large}} = P_{\text{small}} = 500 \text{ Pa}$$

Step 3 — Note about the force: The force on the large piston is larger (pressure $\times$ bigger area), but the *pressure* itself stays 500 Pa.

Why other options are wrong:

- Option A (200): wrongly scales the pressure down by area.
- Option C (1250): wrongly scales the pressure up by area.
- Option D (0): pressure is not lost in transmission through the fluid.

Final Answer: 500 Pa $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q12

Q13.

Solution

Concept — Floating and average density: A body floats when its average density is less than that of the fluid, so the weight of water it displaces can equal its own weight.

Step 1 — Consider the hull's shape: A ship is hollow, enclosing a large volume of air along with the steel.

Step 2 — Compare densities: The combined steel-plus-air structure has an *average* density lower than water, even though solid steel is denser.

Step 3 — Apply the floating condition: Because the average density is less than water's, the ship displaces enough water to support its weight and floats.

Why other options are wrong:

- Option A: shaping steel does not change its actual material density.
- Option B: buoyant force depends on displaced volume, not on how heavy the object "feels."
- Option C: ships are not filled with helium; the air inside is ordinary air.

Final Answer: Average density less than water $\Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q13

Q14.

Solution

Concept — Calorie to joule conversion: Since 1 calorie $= 4.2$ J, multiply the number of calories by 4.2 to get joules.

Step 1 — Write the conversion:

$$E = (\text{calories}) \times 4.2$$

Step 2 — Substitute 50 calories:

$$E = 50 \times 4.2$$

Step 3 — Multiply:

$$E = 210 \text{ J}$$

Why other options are wrong:

- Option B (11.9): divides 50 by 4.2 instead of multiplying.
- Option C (54.2): adds 4.2 to 50.
- Option D (45.8): subtracts 4.2 from 50.

Final Answer: 210 J $\Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q14

Q15.

Solution

Concept — Kinetic energy: A moving body has kinetic energy $\text{KE} = \frac{1}{2}mv^2$.

Step 1 — Write the formula:

$$\text{KE} = \frac{1}{2}mv^2$$

Step 2 — Substitute $m = 50$ kg and $v = 6$ m/s:

$$\text{KE} = \frac{1}{2} \times 50 \times (6)^2$$

Step 3 — Evaluate the square:

$$(6)^2 = 36$$

Step 4 — Compute:

$$\text{KE} = \frac{1}{2} \times 50 \times 36 = 25 \times 36 = 900 \text{ J}$$

Why other options are wrong:

- Option A (300): multiplies $\frac{1}{2}mv$ without squaring the velocity.
- Option C (150): uses $\frac{1}{2}mv$ with $v = 6$, omitting the square.
- Option D (1800): omits the factor of one-half.

Final Answer: 900 J $\Rightarrow \boxed{\text{B}}$

Answer: (B) 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 $I = 4$ A and $R = 7\ \Omega$:

$$V = 4 \times 7$$

Step 3 — Simplify:

$$V = 28 \text{ V}$$

Why other options are wrong:

- Option A (1.75): divides resistance by current.
- Option B (11): adds current and resistance.
- Option D (3): subtracts current from resistance.

Final Answer: 28 V ⇒ C

Answer: (C) **Go Back to Q16**

Q17.

Solution

Concept — Resistors in series: In a series circuit the total resistance is the sum of the individual resistances.

Step 1 — Write the formula:

$$R_{\text{total}} = R_1 + R_2$$

Step 2 — Substitute $6\ \Omega$ and $9\ \Omega$:

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

Step 3 — Add:

$$R_{\text{total}} = 15\ \Omega$$

Why other options are wrong:

- Option A (3.6): uses the parallel-combination formula instead.
- Option B (3): subtracts the resistances.
- Option C (54): multiplies the resistances.

Final Answer: 15 $\Omega \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q17

Q18.

Solution

Concept — Two resistors in parallel: For two resistors in parallel, the combined resistance is the product divided by the sum, $R_\text{p} = \dfrac{R_1 R_2}{R_1 + R_2}$.

Step 1 — Write the formula:

$$R_\text{p} = \frac{R_1 R_2}{R_1 + R_2}$$

Step 2 — Substitute $R_1 = 6\ \Omega$ and $R_2 = 12\ \Omega$:

$$R_\text{p} = \frac{6 \times 12}{6 + 12}$$

Step 3 — Compute the product and the sum:

$$R_\text{p} = \frac{72}{18}$$

Step 4 — Simplify:

$$R_\text{p} = 4\ \Omega$$

Why other options are wrong:

- Option B (18): adds the resistors as if in series.
- Option C (9): takes the average of the two values.
- Option D (2): uses the wrong sum in the denominator.

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

Answer: (A) Go Back to Q18

Q19.

Solution

Concept — Cost of electrical energy: Energy in kilowatt-hours equals power (kW) times time (h); cost equals energy times the rate per kWh.

Step 1 — Find the energy used:

$$\text{Energy} = 2\text{ kW} \times 5\text{ h} = 10\text{ kWh}$$

Step 2 — Write the cost formula:

$$\text{Cost} = \text{Energy} \times \text{rate}$$

Step 3 — Substitute energy $= 10$ kWh and rate $=$ Rs. 6/kWh:

$$\text{Cost} = 10 \times 6$$

Step 4 — Simplify:

$$\text{Cost} = \text{Rs. } 60$$

Why other options are wrong:

- Option A (12): multiplies power by rate only, ignoring the 5 hours.
- Option B (30): multiplies hours by rate, ignoring the power.
- Option D (10): gives the energy in kWh, not the money cost.

Final Answer: Rs. 60 $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q19

Q20.

Solution

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

Step 1 — Write the relation:

$$E_{\text{total}} = n \times E$$

Step 2 — Substitute $n = 6$ cells of 1.5 V each:

$$E_{\text{total}} = 6 \times 1.5$$

Step 3 — Multiply:

$$E_{\text{total}} = 9 \text{ V}$$

Why other options are wrong:

- Option A (1.5): the EMF of a single cell only.
- Option B (0.25): divides the EMF by the number of cells (parallel-like error).
- Option C (4.5): adds only three cells.

Final Answer: 9 V $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q20

Q21.

Solution

Concept — Electric heater: An electric heater passes current through a high-resistance element, and the I^2R heating effect converts electrical energy directly into heat.

Step 1 — Identify the energy conversion: Input is electrical energy; output is heat (thermal) energy.

Step 2 — Match to the device: The device performing electrical $\rightarrow$ heat conversion is the electric heater.

Why other options are wrong:

- Option A (Motor): converts electrical energy into mechanical motion.
- Option C (Generator): converts mechanical energy into electrical energy.
- Option D (Transformer): changes AC voltage levels, ideally without converting energy to heat.

Final Answer: Electric heater $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q21

Q22.

Solution

Concept — Magnetic field of a bar magnet: The magnetic field lines are most concentrated (closest together) at the poles, so the field is strongest there.

Step 1 — Recall the field-line pattern: Field lines crowd together at the two ends of the magnet.

Step 2 — Relate density to strength: Where field lines are most closely packed, the field is strongest; this occurs at the poles.

Why other options are wrong:

- Option A (centre): the field is weakest near the middle, where opposite-pole effects cancel.
- Option B (equally everywhere): the field clearly varies with position.
- Option D (only outside): a magnet has a field both inside and outside; strength is greatest at the poles.

Final Answer: At the two poles $\Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q22

Q23.

Solution

Concept — Fuse: A fuse contains a thin wire that melts when the current exceeds a safe value, breaking the circuit and protecting it from overload.

Step 1 — Identify the protective action: "Melts and breaks the circuit on excessive current" is exactly the function of a fuse.

Step 2 — Confirm the principle: The heating effect of a large current (I^2R) melts the fuse wire, cutting off the supply.

Why other options are wrong:

- Option A (Capacitor): stores charge; it does not break a circuit on overload.
- Option B (Transformer): changes voltage levels, not a safety cut-off.
- Option C (Diode): allows current in one direction; it does not melt to protect against overload.

Final Answer: Fuse $\Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q23

Q24.

Solution

Concept — Rectifier: A rectifier is an electronic device (using diodes) that converts alternating current (AC) into direct current (DC).

Step 1 — Identify the required conversion: The task is AC $\rightarrow$ DC.

Step 2 — Match to the device: The device that performs AC-to-DC conversion is the rectifier.

Why other options are wrong:

- Option B (Inverter): does the reverse, DC $\rightarrow$ AC.
- Option C (Transformer): changes AC voltage levels, but keeps it as AC.
- Option D (Alternator): a machine that generates AC, not one that converts it.

Final Answer: Rectifier $\Rightarrow \boxed{A}$

Answer: (A) Go Back to Q24

Q25.

Solution

Concept — Heading indicator (directional gyro): The heading indicator uses a gyroscope to show the aircraft's heading steadily, and is periodically aligned with the magnetic compass.

Step 1 — Match the function to the instrument: Showing the direction the nose points (heading) is the job of the heading indicator.

Step 2 — Confirm the principle: Its gyroscope gives a steady reading free of the swinging and lag of a magnetic compass.

Why other options are wrong:

- Option A (Altimeter): shows height above sea level, not heading.
- Option C (Airspeed indicator): shows speed through the air.
- Option D (Vertical speed indicator): shows the rate of climb or descent.

Final Answer: Heading indicator (directional gyro) $\Rightarrow \boxed{B}$

Answer: (B) Go Back to Q25

Q26.

Solution

Concept — Cowling: The cowling is the removable streamlined cover fitted around an aircraft engine; it reduces aerodynamic drag and protects the engine while allowing easy access for maintenance.

Step 1 — Identify the marked part: The cover wrapped around the engine in the outline is the cowling.

Step 2 — Confirm its role: It smooths the airflow over the engine and shields the internal parts.

Why other options are wrong:

- Option B (Fuselage): the central body of the aircraft, not the engine cover.
- Option C (Aileron): a control surface on the wing.
- Option D (Spar): the main spanwise structural member inside a wing.

Final Answer: Cowling $\Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q26

Q27.

Solution

Concept — Roll and pitch control surfaces: Ailerons on the wing trailing edges control roll (about the longitudinal axis), while elevators on the horizontal tail control pitch (about the lateral axis).

Step 1 — Match the wing pair: The surfaces on the wing trailing edges that produce roll are the ailerons.

Step 2 — Match the tail pair: The surfaces on the horizontal tail that produce pitch are the elevators.

Step 3 — State them in the asked order (wing first, then tail): The wing pair are ailerons; the tail pair are elevators.

Why other options are wrong:

- Option A (Rudder and flaps): the rudder controls yaw on the vertical fin, not roll.
- Option B (Elevator and ailerons): correct surfaces but in the wrong order for the question.

- Option C (Flaps and rudder): flaps add lift/drag and the rudder controls yaw, not roll or pitch here.

Final Answer: Ailerons and elevator ⇒ D

Answer: (D) Go Back to Q27

Q28.

Solution

Concept — Centre of pressure: The pressure distribution over an aerofoil can be replaced by a single resultant lift force acting at one point, called the centre of pressure.

Step 1 — Recall what the point represents: The lift force is spread over the whole surface, but for analysis it is taken to act at one effective point.

Step 2 — Name that point: That single point of action of the total aerodynamic force is the centre of pressure.

Why other options are wrong:

- Option A (Leading edge): the front edge of the aerofoil, not where the resultant acts.
- Option B (Trailing edge): the rear edge of the aerofoil.
- Option D (Wingtip): the outer end of the wing, unrelated to the resultant force point.

Final Answer: Centre of pressure ⇒ C

Answer: (C) Go Back to Q28

Q29.

Solution

Concept — Four forces of flight (horizontal balance): Forward acceleration occurs when the forward force (thrust) exceeds the backward force (drag).

Step 1 — Identify the horizontal forces: Thrust acts forward; drag acts backward.

Step 2 — Apply Newton's second law horizontally: If thrust $>$ drag, there is a net forward force, so the aircraft accelerates forward.

Why other options are wrong:

- Option B (drag > thrust): produces a net backward force, so the aircraft slows down.
- Option C (lift > weight): causes the aircraft to climb, not to speed up horizontally.
- Option D (weight > lift): causes the aircraft to descend, not to accelerate forward.

Final Answer: Thrust greater than drag ⇒ A

Answer: (A) Go Back to Q29

Q30.

Solution

Concept — Ignition system: The ignition system produces the high-energy spark that ignites the fuel-air mixture, starting and then sustaining combustion in the engine.

Step 1 — Identify the function needed: Producing a spark to start and sustain combustion is the defining job of the ignition system.

Step 2 — Match to the system: In both piston and turbine engines, the igniters/spark plugs of the ignition system fire the mixture.

Why other options are wrong:

- Option A (Hydraulic system): operates the landing gear, flaps and brakes using pressurised fluid.
- Option C (Fuel system): stores and delivers fuel, but does not provide the spark.
- Option D (Oxygen system): supplies breathing oxygen to crew and passengers at altitude.

Final Answer: Ignition system ⇒ B

Answer: (B) Go Back to Q30

Answer Key

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