MARKING SCHEME

SECTION A (30 MARKS)

1.

(a)

- Domestic/Residential (Lighting homes).
- Industrial (Tea processing factories).
- Transport (Electric buses/Charging).
- Health/Medical (Hospital equipment).

(b) Electrical Technician / Electrical Engineer.

2.

(a) i) Battery / DC Power Supply.

ii) Switch.

iii) Resistor / Load.

(b) To measure the amount of electric current flowing in the circuit.

3.

(a) Personal Protective Equipment (PPE).

(b) Always ensure the power is switched off at the main source before touching connections to prevent electric shock.

4.

(a)

- Conductor: Image A (Copper).
- Insulator: Image B (Glass).
- Semiconductor: Image C (Silicon).

(b) Conductors allow electrons to flow freely through them, while insulators resist the flow of electrons.

5.

(a) The Poles (North and South poles).

(b)

- Use magnetic keepers when storing.
- Avoid dropping or hitting magnets.
- Store in a North-South direction. (Any 2)

6.

(a) Capacitor.

(b) **False** (It stores energy in an *electric* field).

7.

(a) Primary Cell: Dry Cell (Non-rechargeable).

Secondary Cell: Car Battery / Lead-acid battery (Rechargeable).

(b) Recycling through authorized e-waste collectors / Do not burn or throw in water sources.

8.

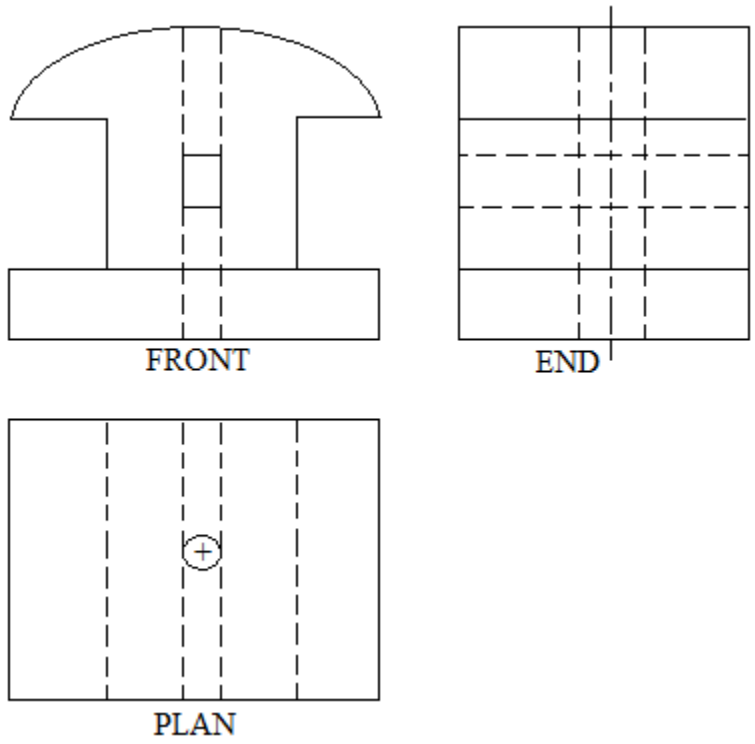
(a) Right-Hand Grip Rule (or Screw Rule).

(b) The production of magnetic fields by the passage of an electric current through a conductor.

SECTION B (50 MARKS)

9.

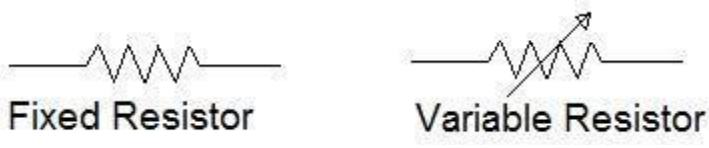
(a)



i. *Angle of projection=1 mark*
ii. *FE 3 faces 1 mark*
iii. *EE 3 faces=1 mark*
iv. *Plan 2 faces= 1 mark*
v. *Neatness ½ mark*
vi. *Hidden details ½ mark*
vii. *Centre line 1 mark*

(b) Isometric uses 30° angles for both receding sides; Oblique uses a 45° angle for the receding side and shows the front face flat.

(c) *[Check for correct symbols: Zig-zag line for fixed; Zig-zag with an arrow for variable].*



(d) A 2D sketch shows only two dimensions (length/width) and one face, while a 3D pictorial shows three dimensions and multiple faces at once.

10.

(a)

$I = \frac{V}{R} = \frac{12}{4} = 3\text{A}$

(b) Current is directly proportional to Voltage; as voltage increases, current increases.

(c) i) Parallel Connection.

ii) Voltage remains the same across all branches; Total resistance decreases as more resistors are added.

11.

(a) J) Pylons/Towers. K) Insulators. L) Conductors/Cables. M) Transformer.

(b) To increase the voltage level and reduce current for efficient long-distance transmission.

(c) To minimize energy loss (power loss) due to resistance in the long cables.

12.

(a) P-N Junction Diode.

(b) The intentional addition of impurities to an intrinsic (pure) semiconductor to change its electrical properties.

(c) i) Forward Biasing.

ii) The depletion layer narrows/shrinks, allowing current to flow.

(d) Rectification (AC to DC), LED lighting, Signal clipping.

13.

(a) Service cable, Cut-out fuse, Energy meter, Consumer Control Unit (Main switch/MCBs).

(b) It provides a low-resistance path for leakage current to flow to the ground, protecting users from electric shock.

(c)

i. Three terminals (Emitter, Base, Collector).
ii. Switching capability.
iii. Signal amplification.

14.

(a) Solenoid (or Electromagnet).

(b)

- Increasing the number of turns in the coil.
- Increasing the amount of current.
- Inserting a soft iron core. (Any 2)