

END TERM 3 2026 — GRADE 10
ELECTRICITY
MARKING SCHEME & TEACHER'S GUIDE
TOTAL: 100 MARKS

GENERAL MARKING GUIDANCE

Award marks for scientifically, technically and curriculum-valid responses. Accept equivalent correct wording, standard symbols and correctly reasoned alternatives.

1. Any two: prevents electric shock/injury; prevents equipment damage; reduces electrical/fire hazards; promotes safe working practice. **(2 marks)**
2. Conductor: permits current to flow readily, e.g. copper/aluminium. Insulator: strongly resists current flow, e.g. rubber/PVC/glass. **(2 marks)**
3. Primary cell is generally non-rechargeable; secondary cell is rechargeable. **(2 marks)**
4. A capacitor stores electrical charge/energy in an electric field; application may include timing/control, filtering/smoothing, motor control or another valid application. **(2 marks)**
5. Any two: isometric, oblique, perspective. **(2 marks)**
6. Any two valid properties: permeability, retentivity, coercivity, ability to become magnetised, attraction/repulsion behaviour. **(2 marks)**
7. Any two: current through coil, number of turns, core material, coil geometry/length. **(2 marks)**
8. An inductor stores energy in its magnetic field when current flows; valid application such as filtering, energy storage, relay/inductive control. **(2 marks)**
9. Any two: generating station, step-up transformer, transmission lines, step-down transformer, distribution network/substation. **(2 marks)**
10. Any two: service cable, cut-out, energy meter, main switch, consumer control/protective unit. **(2 marks)**

QUESTION 11 — D.C. CIRCUITS (8 MARKS)

- (a) Correct circuit with 12 V source, 2 Ω and 4 Ω series resistors, ammeter in series and voltmeter across 4 Ω . **(3 marks)**

Award 1 mark each for correct source/resistors, correct ammeter placement and correct voltmeter placement.

- (b) $R_t = 2 + 4 = 6 \Omega$. **(2 marks)**

M1 series addition; A1 6 Ω .

- (c) $I = V/R = 12/6 = 2 \text{ A}$. **(2 marks)**

M1 formula/substitution; A1 2 A.

- (d) V across 4 $\Omega = IR = 2 \times 4 = 8 \text{ V}$. **(1 marks)**

QUESTION 12 — CELLS AND BATTERIES (6 MARKS)

- (a) Two 1.5 V cells in series give 3.0 V. **(3 marks)**

2 marks for correct series arrangement; 1 mark for 3.0 V.

- (b) Any three: correct charger; correct polarity; avoid overcharging; suitable ventilation/environment; inspect for damage/leakage; correct charging current; safe handling. **(3 marks)**

QUESTION 13 — CAPACITORS (6 MARKS)

- (a) $C_t = 2 + 4 = 6 \mu\text{F}$. **(2 marks)**

M1 correct parallel relation; A1 6 μF .

- (b) 12 V. **(1 marks)**

(c) Any three linked points: stores/releases charge; charges/discharges with time; provides time delay; useful in timer/control circuits. **(3 marks)**

QUESTION 14 — PICTORIAL DRAWING (4 MARKS)

(a) Accurate isometric sketch showing three visible faces and correct isometric form. **(3 marks)**

1 mark axes/form; 1 mark three-face representation; 1 mark accuracy/clarity.

(b) Any valid advantage: clear 3-D visualisation; assists engineering communication; helps interpretation/design. **(1 marks)**

QUESTION 15 — ELECTROMAGNETISM (6 MARKS)

(a) Correct circular field pattern around a straight conductor with direction related correctly to current. **(3 marks)**

1 mark pattern; 1 mark direction; 1 mark clear indication.

(b) Any three: electric bell, relay, magnetic lifting device, magnetic switch, motor-related electromagnetic device, or other valid application. **(3 marks)**

QUESTION 16 — INDUCTORS AND INDUCTANCE (10 MARKS)

(a) Energy is stored in the magnetic field produced by current through the inductor. **(2 marks)**

(b) $L_t = L_1 + L_2 = 3 + 6 = 9 \text{ H}$. **(3 marks)**

M1 relation; M1 substitution; A1 9 H.

(c) Any two: inductance, current rating, core/material, resistance, operating frequency/characteristics. **(2 marks)**

(d) Valid application with explanation, e.g. filtering/energy storage/control in an appliance. **(3 marks)**

1 mark application; 2 marks correct explanatory link.

QUESTION 17 — GENERATION, TRANSMISSION AND DISTRIBUTION (10 MARKS)

(a) Generation → step-up transformer → high-voltage transmission → step-down transformer → distribution → consumer. **(5 marks)**

Award 1 mark for each correctly ordered major stage/component, maximum 5.

(b) High voltage permits lower current for a given transmitted power, reducing I^2R losses/heating. **(2 marks)**

C1 lower current; C1 reduced losses.

(c) Any three: supports industry/business; household services; communication/technology; health/education; productivity/economic development; reliable supply. **(3 marks)**

QUESTION 18 — CONSUMER INTAKE AND FINAL CIRCUITS (10 MARKS)

(a) Any four: service cable, cut-out, energy meter, main switch, consumer control/protection unit or other correct intake equipment. **(4 marks)**

(b) Accept the curriculum-aligned sequence, e.g. service cable → cut-out → energy meter → main switch → consumer control/protection → final circuits. **(3 marks)**

Award for correct ordering of the principal stages; maximum 3.

(c) Any three: correct circuit design; protective devices; secure connections; earthing/protection; continuity/insulation/operational testing; compliance with rules; safe commissioning. **(3 marks)**

QUESTION 19 — SEMICONDUCTOR THEORY (10 MARKS)

(a) Intrinsic: relatively pure semiconductor. Extrinsic: semiconductor whose conductivity is modified by controlled doping. **(3 marks)**

(b) Doping changes carrier concentration. Donor impurities produce N-type material with electrons as majority carriers; acceptor impurities produce P-type material with holes as majority carriers. **(3 marks)**

(c) Correct labelled PN-junction sketch showing P and N regions and junction/charge-carrier region. **(2 marks)**

(d) Any two: controlled conductivity; basis of diodes/transistors; electronic switching/control; importance in electronic engineering. **(2 marks)**

QUESTION 20 — SEMICONDUCTOR DIODES AND TRANSISTORS (10 MARKS)

(a) Forward bias permits significant current after the junction barrier is overcome; reverse bias largely opposes current apart from small leakage until breakdown conditions. **(4 marks)**

2 marks for each bias condition.

(b) Any two: rectification, regulation/reference, switching, LED/display, protection or other valid application. **(2 marks)**

(c) A transistor switch uses its input/control condition to place the transistor in conducting or non-conducting state, thereby controlling output current. **(3 marks)**

C1 input control; C1 switching states; C1 output-current control.

(d) Any one: isolate power before changes; observe polarity; correct meter range; avoid short circuits; follow component ratings; other valid safety/troubleshooting precaution. **(1 marks)**

CURRICULUM TRACEABILITY

Questions	Strand	Sub-strand(s)	Cognitive demand	Marks
1	1.0 Fundamentals of Electricity	1.1 Introduction to Electricity	Understand	2
2, 11	1.0 Fundamentals of Electricity	1.2 D.C Electric Circuits	Apply/Analyse	10
3, 12	1.0 Fundamentals of Electricity	1.3 Cells and Batteries	Understand/Apply	8
4, 13	1.0 Fundamentals of Electricity	1.4 Capacitors and Capacitance	Understand/Apply	8
5, 14	1.0 Fundamentals of Electricity	1.5 Pictorial Drawings	Apply/Create	6
6	2.0 Electrical Machines	2.1 Magnetism	Understand	2
7, 15	2.0 Electrical Machines	2.2 Electromagnetism	Apply/Analyse	8
8, 16	2.0 Electrical Machines	2.3 Inductors and Inductance	Understand/Apply	12
9, 17	3.0 Electrical Installation	3.1 Generation, Transmission and Distribution of Electricity	Understand/Analyse	12
10, 18	3.0 Electrical Installation	3.2 Equipment at the Consumers Intake Point; 3.3 Final Circuits	Understand/Apply	12
19	4.0 Electronics	4.1 Semiconductor Theory	Understand/Apply	10
20	4.0 Electronics	4.2 Semiconductor Diodes; 4.3 Transistors	Understand/Analyse	10

TOTAL-MARK VERIFICATION

Section A = 20 marks; Section B = 30 marks; Section C = 30 marks; Section D = 20 marks. TOTAL = 100 marks.

All 14 Grade 10 sub-strands in the main curriculum structure are represented.

Marking codes: M = Method / Formula; A = Accuracy / Correct Answer; C = Concept / Curriculum Point.