



**ZIMBABWE**

**MINISTRY OF HIGHER AND TERTIARY EDUCATION,  
INNOVATION, SCIENCE AND TECHNOLOGY DEVELOPMENT**

**HIGHER EDUCATION EXAMINATIONS COUNCIL  
(HEXCO)**

**NATIONAL CERTIFICATE**

**IN**

**DPF, MOTOR VEHICLE MACHANICS AND MVBR**

**MODULE: Automotive Electrics and Electronic  
Systems Maintenance**

**PAPER NO: 346/22/M10**

**DURATION: 3 hours**

**NOVEMBER/DECEMBER 2025 EXAMINATION**

**REQUIREMENTS**

1. Pen
2. Answer booklet
3. Drawing instruments

**INSTRUCTIONS TO CANDIDATE**

1. Answer all questions.
2. Each question carries 20 marks.

QUESTION 1

1.1 Define the following electrical terms:

- a) Current (2 marks)
- b) EMF (2 marks)
- c) Resistance (2 marks)
- d) Power (2 marks)
- e) Potential difference (2 marks)

1.2 State three (3) effects of electricity. (3 marks)

1.3 Explain the following electrical faults:

- a) Open circuit (2 marks)
- b) Short circuit (2 marks)

1.4 Draw electrical symbols for the following:

- a) Bulb (1 mark)
- b) Resistor (1 mark)
- c) Fuse (1 mark)

QUESTION 2

2.1 Draw a simple circuit with an insulated earth return system. (5 marks)

2.2 State two (2) faults that can occur to each of the following:

- a) Alternator (2 marks)
- b) Starter motor (2 marks)
- c) Coil pack (2 marks)
- d) Bulb (2 marks)
- e) Flasher unit (2 marks)

2.3 Identify three (3) causes of circuit faults. (3 marks)

2.4 State two (2) commonly used protection devices on an automobile. (2 marks)



QUESTION 3

- a) Give three (3) visual checks that can be done on an automobile charging system. (3 marks)
- b) Define:
- i) Ohm's law (2 marks)
  - ii) Kirchoff's law of current (2 marks)
- c) Name the instrument that is used to measure the following:
- i) Alternator voltage output (2 marks)
  - ii) Fuse open circuit (2 marks)
  - iii) Circuit voltage drop (2 marks)
  - iv) Fuel injector resistance (2 marks)
  - v) Engine speed (2 marks)
- d) Give one (1) application of the following electronic components:
- i) Capacitor (1 mark)
  - ii) Diode (1 mark)
  - iii) Transistor (1 mark)

QUESTION 4

- a) Identify five (5) input sensors and five (5) output actuators of an automobile ECU. (10 marks)
- b) State two (2) applications of rotary actuators. (2 marks)
- c) Give two (2) common causes of failure of the following:
- i) Sensor (2 marks)
  - ii) Actuator (2 marks)
  - iii) ECU (2 marks)
- d) Explain the difference between NTC and PTC sensor. (2 marks)

QUESTION 5

- a) Identify five battery routine services that can be performed by a technician.  
(5 marks)
- b) Draw a block diagram to show:
- i) Two batteries connected in parallel (3 marks)
  - ii) Two batteries connected in series (3 marks)
- c) State three (3) methods of identifying battery terminals.  
(3 marks)
- d) State the reason for performing the following battery tests:
- i) Hydrometer test (1 mark)
  - ii) Load test (1 mark)
- e) Name four (4) safety precautions to be observed when working with batteries.  
(4 marks)

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