



ZIMBABWE

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

**HIGHER EDUCATION EXAMINATIONS COUNCIL
(HEXCO)**

NATIONAL CERTIFICATE

IN

MOTOR VEHICLE MECHANICS, DPF, MVBR

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

PAPER NO: 346/22/M10

DURATION: 3 Hours

MAY/JUNE 2024 EXAMINATION

REQUIREMENTS

INSTRUCTIONS TO CANDIDATE

- 1) Section A: Answer all questions. (40 marks)**
- 2) Section B: answer any four (4) questions. (60 marks).**

This paper consists of 5 printed pages.

SECTION A: ANSWER ALL QUESTIONS (40 MARKS)

QUESTION 1

a) Define the following electrical terms:

- i) Electricity (1 mark)
- ii) Electrons (1 mark)
- iii) Voltage (1 mark)
- iv) Current (1 mark)
- v) Resistivity (1 mark)

b) Write the following abbreviations in full:

- i) PD
- ii) EMF
- iii) NTC
- iv) PTC
- v) DC (5 marks)

c) Name five (5) components that constitute a basic electrical circuit.

(5 marks)

d) Give three (3) functions of a motor vehicle battery.

(3 marks)

e) State two types of secondary batteries.

(2 marks)

QUESTION 2

a) Identify any three (3) basic functions of an OBD machine. (3 marks)

b) State the distinct instrument used to measure the following.

- i) Voltage (1 mark)
- ii) Current (1 mark)
- iii) Resistance (1 mark)

c) Show the conventional symbols of the following electrical components.

- i) 12V battery.
- ii) Variable resistor.
- iii) Diode.
- iv) Spark plug.
- v) Light/lamp.
- vi) Fuse.
- vii) Motor.

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- viii) Zener diode
 - ix) Capacitor/condenser
 - x) Selector switch. (10 marks)
- d) Give four (4) hints that can be followed to maintain a lead acid battery in good work condition. (4 marks)

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SECTION B: ANSWER ANY FOUR (4) QUESTIONS (60 MARKS)

QUESTION 3

- a) Name five (5) major components of a starter motor. (5 marks)
- b) Describe five (5) causes of undercharging on a vehicle fitted with an alternator. (5 marks)
- c)
 - i) Explain the characteristics of a shunt wound motor. (2 marks)
 - ii) State three (3) applications of shunt wound motors on a motor vehicle Battery. (3 marks)

QUESTION 4

- a) Indicate five (5) consideration to be done when rewiring and laying a loom on vehicle lighting system. (5 marks)
- b) List one (1) probable cause of each of the following faults observed on a lighting system.
 - i) Headlights not working at all. (1 mark)
 - ii) Indicators flash with high frequency on one side. (1 mark)
 - iii) Reverse lights stay on even when the reverse gear is not selected. (1 mark)
 - iv) Park lights come on when brakes are applied. (1 mark)
 - v) No headlights on one side. (1 mark)
- c) State the colour codes represented by the following fuse ratings.
 - i) Brown (1 mark)
 - ii) Red (1 mark)
 - iii) Orange (1 mark)
 - iv) Blue (1 mark)
 - v) Green (1 mark)

QUESTION 5

- a) The particles which carry charge in an atom are and (2 marks)
- b) List four (4) factors that influence resistance of a conductor. (4 marks)
- c) Define doping with reference to semiconductors. (2 marks)

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- d) Battery terminal polarity can be identified through, and.....
(3 marks)
- e) Identify the instruments used to measure the following:
- i) Dwell angle. (1 mark)
 - ii) Spark plug gap. (1 mark)
 - iii) , Specific gravity of a battery. (1 mark)
 - iv) Light intensity (1 mark)

QUESTION 6

- a) Identify three (3) main types of pulse generators used in electronic ignition systems. (3 marks)
- b) State three (3) major causes of faults in the ignition system. (3 marks)
- c) Name the sensor used to measure the following conditions on a vehicle.
- i) Exhaust gas composition. (1 mark)
 - ii) Pedal position. (1 mark)
 - iii) Combustion quality. (1 mark)
 - iv) Ambient temperature. (1 mark)
 - v) Turbo pressure. (1 mark)
- d) Explain four (4) advantages of electronic ignition system over mechanical ignition system. (4 marks)

QUESTION 7

- a) Draw a diagram to show the internal connections of a double coil ignition pack. (5 marks)
- b) List any six (6) warning lights that can be found on a modern vehicle instrument cluster. (6 marks)
- c) Indicate the four (4) forms of data that is necessary for diagnostic and other work to be done on a motor vehicle. (4 marks)

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