



ZIMBABWE

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

**HIGHER EDUCATION EXAMINATIONS COUNCIL
(HEXCO)**

NATIONAL CERTIFICATE

IN

AUTOMOTIVE ENGINEERING COURSES: DPF, MOTOR MECHANICS, MVBR

MODULE: Automotive Electrics and Electronics PAPER NO: 346/22/M10
System Maintenance

DURATION: 3 hours

OCTOBER/NOVEMBER 2024 EXAMINATION

REQUIREMENTS

- 1. Answer booklet**
- 2. Drawing instruments**
- 3. Pen**

INSTRUCTIONS TO CANDIDATE

- 1. Section A: Answer all questions [20 marks].**
- 2. Section B: Answer all questions [20 marks].**
- 3. Section C: Answer all questions [60 marks].**

This paper consists of 5 printed pages.

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SYSTEM MAINTENANCE

SECTION A [20 marks]

Answer all questions.

QUESTION 1

- a) State the units of:
- | | |
|----------------------|-----------------------|
| i) Power | (1 mark) ⁷ |
| ii) Capacitance | (1 mark) |
| iii) Frequency | (1 mark) |
| iv) Reserve capacity | (1 mark) |
| v) Resistance | (1 mark) |
- b) A sensor can also be called a (2 marks)
- c) Define doping. (2 marks)
- d) Identify three (3) major protective devices used in motor vehicle. (3 marks)
- e) Give three (3) tests that can be done on a lead acid battery. (3 marks)
- f) An Ohmmeter is connected in in a circuit. (1 mark)
- g) State Ohm's law. (2 marks)
- h) Differentiate between a conductor and insulator. (2 marks)

SECTION B [20 marks]

QUESTION 2

(A) Part -

- a) Give one (1) cause of frequent electrolyte topping up on a lead acid battery. (1 mark)
- b) Identify any four (4) variables measured by sensors. (4 marks)
- c) A relay is used to in a circuit. (1 mark)
- d) Calculate the power generated in a circuit whose current is 3Amps and resistance of 300 Ohms. (2 marks)
- e) Identify three (3) basic logic gates. (3 marks)
- f) When preparing electrolyte add to (2 marks)

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g) Name the sensor used to measure the following conditions on a motor vehicle:

- i) Exhaust gas composition (1 mark)
- ii) Pedal position (1 mark)
- iii) Combustion quality (1 mark)

Part

b) Name the instrument used to measure the following:

- i) Specific gravity (1 mark)
- ii) Voltage (1 mark)
- iii) Resistance (1 mark)
- iv) Current (1 mark)

SECTION C [60 marks]

Answer all questions.

QUESTION 3

a) Explain the functions of the following starter motor components:

- i) Armature (1 mark)
- ii) Overrunning clutch (1 mark)
- iii) Solenoid (1 mark)
- iv) Fork lever (1 mark)
- v) Pinion (1 mark)

b) Identify any three (3) faults that causes the starter motor not to function. (3 marks)

c) Give any one test that can be done on:

- i) Field coils (1 mark)
- ii) Armature (1 mark)

QUESTION 4

a) Define the following ignition terms:

- i) Detonation (2 marks)
- ii) Run-on (2 marks)

b) Identify three (3) types of pulse generators. (3 marks)

c) Name any three (3) components of a diesel engine heating system. (3 marks)

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QUESTION 5

- a) Define a diode. (1 mark)
- b) State two (2) symptoms observed on each of the following conditions:
- i) Overcharging alternator (2 marks)
 - ii) Under charging of alternator (2 marks)
- c) Give two (2) tests that can be done on:
- i) Rotor (2 marks)
 - ii) Stator (2 marks)
- d) Give one (1) advantage of using LED as stop lights. (1 mark)

QUESTION 6

- a) Write the following abbreviations in full:
- i) LDR (1 mark)
 - ii) ROM (1 mark)
 - iii) LED (1 mark)
 - iv) CDI (1 mark)
- b) Give one (1) cause of the following lighting system faults:
- i) Dim headlights (1 mark)
 - ii) Parklights come on when brakes are applied (1 mark)
 - iii) Reverse lights not coming on when the reverse gear is engaged. (1 mark)
 - iv) Charge warning light remains on when the engine is running. (1 mark)
- c) Give any two (2) types of earth return systems used on automobiles. (2 marks)

QUESTION 7

- a) Identify five (5) types of electronic displays employed in Automotive Engineering. (5 marks)
- b) Identify five (5) tasks that can be done by a vehicle computer diagnostic machine. (5 marks)

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QUESTION 8

- a) ABS stands for (2 marks)
- b) Identify any three (3) components of ABS system. (3 marks)
- c) Give five (5) components of air conditioning system. (5 marks)

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