ELECTRICAL AND ELECTRONIC TECHNOLOGY 2
5135

CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD

Technical and Vocational Education Examination

JUNE XXXX **INTERMEDIATE LEVEL**

Subject Title	**ELECTRICAL AND ELECTRONIC TECHNOLOGY**
Subject Code No.	**5135**
Paper No.	**TWO**

Two Hours Thirty Minute

Answer any FIVE questions, choosing THREE from Section A, TWO from Section B. All questions carry equal marks.

You are reminded of the necessity for good English and orderly presentation in your answers.

SECTION A: ELECTRICAL TECHNOLOGY

Answer any THREE questions from this Section

1. The figures 1A and B below represent two (02) types of head lamp bulbs currently used in modern lighting circuits.

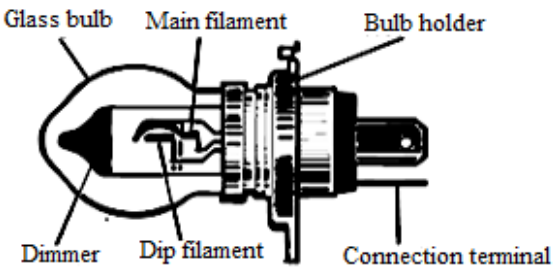

Figure 1A

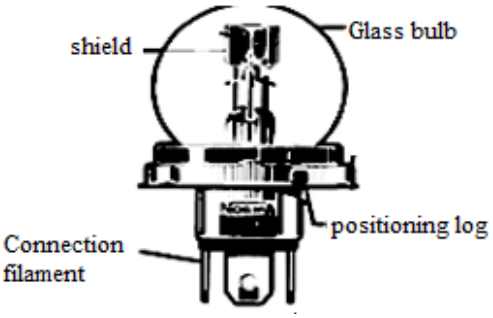

Figure 1B

a. Name each type of bulb in figures 1A and 1B **(1.5mark×2= 3 marks)**

b. Give the role of the Dimmer in figure 1A **(1mark)**

c. The figures 5C and D below represent two (02) types of indicators implanted in the dash board of a modern vehicle.

i. Name each of the indicators. **(1mark×2= 2 marks)**

Figure 1C

Figure 1D

ii. Interprete the following positions ('C', 'H', 'E', 'F'), referring to the figures 5C and D below.

(1 mark×4= 4marks)

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2. Fig 2 below is a type of starter motor drive.

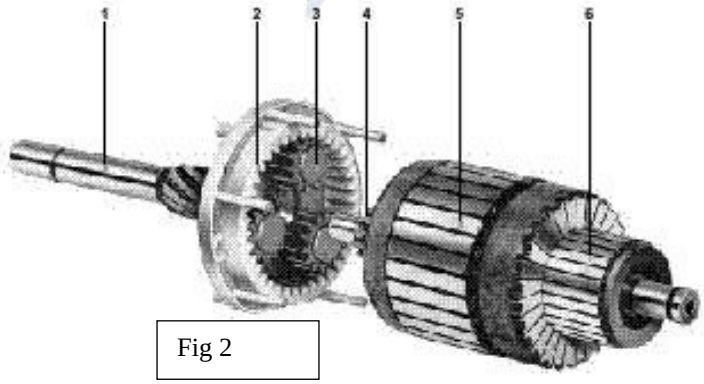

Fig 2

a) State the role of a starter motor. **(2 marks)**

b) Identify the type of starter motor drive in Fig 1 above. **(1 mark)**

c) Identify the numbered parts 1, 2,3,4,5 and 6**.** **(3 marks)**

d) Give the name of the starter motor element that prevents the engine from driving the starter motor.

(1 mark)

e) Give the function of the solenoid in a pre- engage starter motor. **(2 marks)**

f) The cable between the battery and the starter motor must be thick and short enough. Give the reason for this **(1 mark)**

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3. Arcing of contact breaker has been one of the reasons for the development of an electronic ignition system. Fig 3 below represents one type of pulse generator used in the breaker less ignition system.

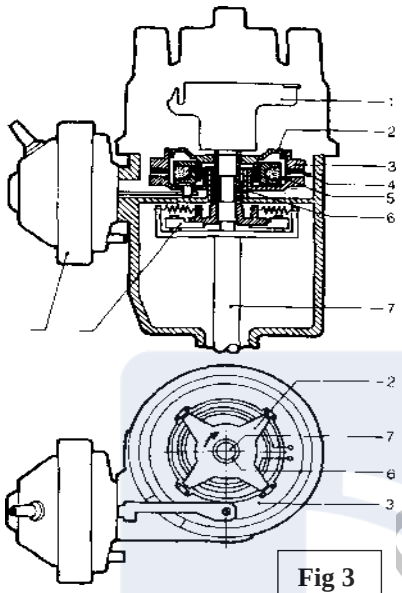

Fig 3

a) List three types of pulse generator. **(3 marks)**

b) Identify the type of pulse generator on Fig 2 above. **(1 mark)**

c) Identify the numbered parts 1, 2,4,5,8 and 9. **(3 marks)**

d) State two advantages and one disadvantage of this system over the contact breaker system.

(3 marks)

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4. A lead acid battery has the following characteristics:

12V	60AH	120A

a. Reproduce Complete the table below to describe the battery in the fully charged state

(2.5 marks)

Terms	Voltage	Positive plate	Negative plate	Voltage of a cell	Number of cell	Electrolyte specific gravity
Description	13.8					

b. Which instrument is used to measure the specific gravity of the electrolyte? **(1mark)**

c. The table below shows different state of charge of a built-in hydrometer of a maintenance free battery.

(1.5 mark)

Built-in hydrometer colour	( ) Green	( ) Yellow or neutral	( )
State of charge of a maintenance free battery			Needs to be charge.

d. After carrying out the hydrometer test from a 12V battery the following readings where obtain

Cells	01	02	03	04	05	06
Values	1.17	1.15	1.27	1.30	1.29	1.20

What conclusion can be drawn from the table above, hence justify your answer. (**1mark**)

……

e. Write down chemical formula of a charged lead-acid batte **(1.5 mark)**

f. Explain any TWO methods of battery ratings**.** **(1 mark)**

g. Give THREE methods of battery testing**.** **(1.5 mark)**

5.

. (a) Define the following:

(i) A conductor **(1 mark)**

(ii) An insulator **(1 mark)**

(iii) Electrical energy **(1 mark)**

(iv) Electrical power **(1 mark)**

(b) Two headlamp bulbs are connected in parallel to a 12V automobile battery as shown below.

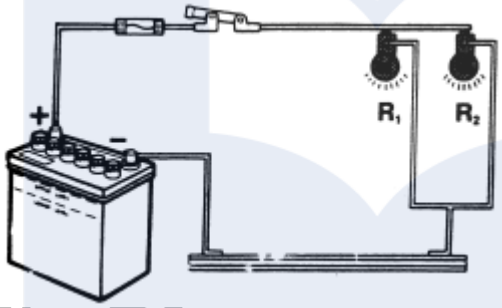

Fig 4 electrical circuit

The resistances of the bulbs are $R_1 = 5\Omega$ and $R_2 = 7\Omega$. Neglecting the resistances of the cables, calculate:

(i) The current (I) circulating through the circuit. **(2 marks)**

(ii) The electrical power (P) being dissipated across the entire circuit whenever the lamps are on. **(2 marks)**

(iii) Give one advantage of this type of circuit over the series circuit as applied in the headlamps system of a given vehicle. **(1mark)**

(iv) Give any two causes of voltage drop in the electrical system of a vehicle. **(1mark)**

SECTION B: ELECTRICAL CALCULATION

Answer any TWO questions from this section

1. a) Define the following :

i Work **(2 marks)**

ii Power **(2 marks)**

iii Efficiency **(2 marks)**

b) State ohm's law **(2 marks)**

c) Name two types of electrical circuits **(2 marks)**

2.

a. A 12v bulb has a current of 3A. Calculate its resistance. **(2 marks)**

b) A conductor powers two 40watts lamps each at 12v. Calculate the current consumed by these lamps. (3 marks)

c) Calculate the cross sectional area of a starter motor cable of length 1.5m long, resistance of 0.001Ω and coefficient of resistivity 0.172Ωm/m^2. **(3 marks)**

d) Give the reason why starter motor cables are thicker in diameter **(2 marks)**

3. The diagram given below is one type of an electrical circuit.

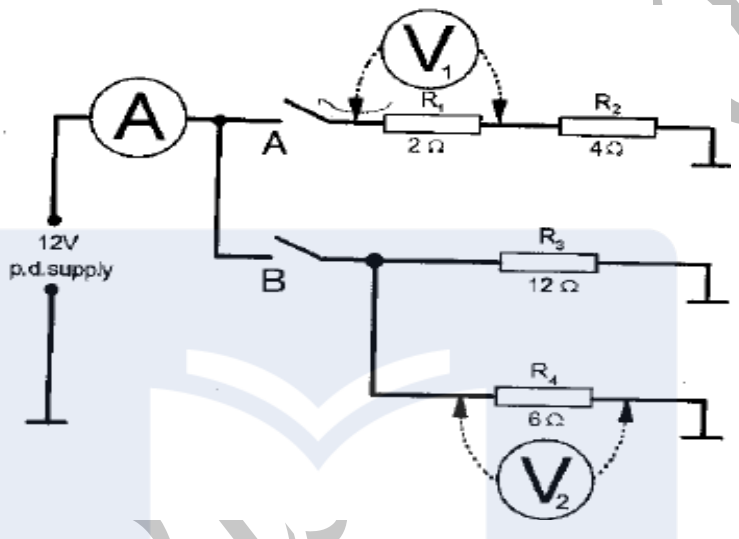

Figure 5

i. Identify the type of circuit **(1mark)**

ii. Calculate the readings on the ammeter and voltmeters V_1 and V_2 when:

- Switch A is closed and switch B is open; **(2.5 marks)**
- Switch B is closed and switch A is open; **(2.5 marks)**
- Both switches are closed **(1.5mark)**

iii. Calculate the resistance of the full circuit. **(2.5 marks)**

4.

a. There are three electrical units subjected to the ohms law. Name the units. **(3 marks)**

b. State ohms law. **(2 marks)**

c. Using a multimeter to test a circuit in a starter motor, the following readings were recorded. A current of 3.6A passed when a voltage of 7v was applied. Calculate

i. The resistance of the circuit. **(2 marks)**

ii. The power used in watts. **(3 marks)**