

7170 Electrical and Electronic Systems 2

CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD

Technical and Vocational Education Examination



JUNE XXXX

ADVANCED LEVEL

Specialty Name (Specialty Code)	
Subject Title	Electrical and Electronic Systems
Paper No.	2
Subject Code No.	7170

Three hours

INSTRUCTIONS TO CANDIDATES

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

You are advised to read carefully through the question paper, before you begin your answers.

Turn Over

XXXX/7170/2/C

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SECTION A: ELECTRICAL/ELECTRONIC TECHNOLOGY

Answer any **THREE** questions from this section

1. Represent below is a typical; motor drive (figure: 01)

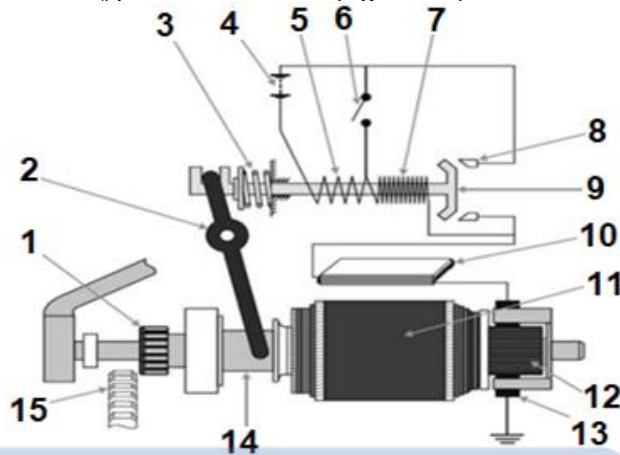


Figure: 01

- Name the type of starter motor drive. (1mark)
- Designate part 1, 3, 5, 7, 9, 10, 12 and 14 of the starting circuit in figure 2 below. (4marks)
- Explain the starter operation. (5marks)
- Differentiate the control circuit and the power (motor) circuit sections of a cranking circuit. (4marks)
- State **TWO** (02) possible tests carried out on the starter system. (3marks)
- List **THREE** (03) symptoms of starting system problems. (3marks)

TOTAL (20 MARKS)

2.
 - Give **TWO** functions of the charging system in the electrical system of a given vehicle. (2 marks)
 - For a 12 volt battery system, what is the normal output voltage from an alternator given that it is in a good working state? (4 marks)
 - Below is the electrical circuit of a three-phase alternator with nine diodes (Figure: 02)

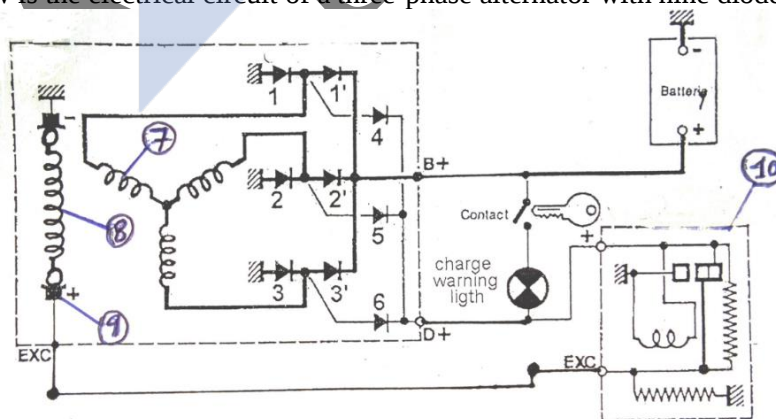


Figure: 02

- Identify the parts labeled 7, 8, 9 and 10 of the above circuit. (4marks)
- Where can one connect a voltmeter in order to check the output of this alternator as the engine is running (2 marks)
- Referring to the above diagram, give **THREE** probable causes of the charge warning or indicator lamp remaining 'ON' as the engine is running (6marks)
- Give any **TWO** types of tests each that you can carry out on the components (7) and (8) during repairs. (2 marks)

- 3
- Identify the lamp in **figure 03** below (1.5marks)
 - Identify the parts. (3.5marks)
 - Identify **TWO (02)** disadvantages of this lamp. (4marks)
 - State **THREE** group of chemical elements halogen refers to. (3marks)
 - List **TWO (02)** advantages of halogen bulbs. (2marks)
 - Explain the phenomenon that prolongs the life of a halogen lamp? (6marks)

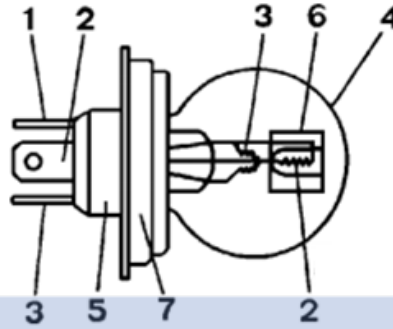


Figure: 03

TOTAL (20MARKS)

Figure 04 shows an electronic flasher unit, which you are expected to interpret.

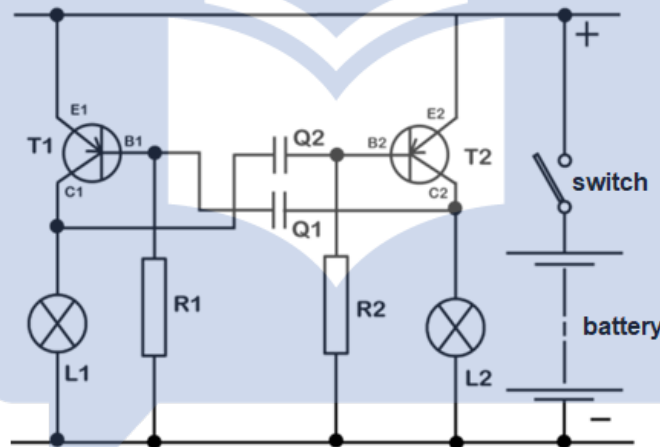


Figure: 04

4. a. Copy and complete the table below in your answer booklet (6marks)

Symbol	Designation
T	
E	
B	
C	
Q	
R	

- Briefly describe the operation of this circuit (4marks)
- What do you understand by a transistor gain? (4marks)

4

- d. With the aid of a sketch, compare the flasher in **fig.04** with a bi-metallic type (6marks)

TOTAL (20MARKS)

5. A vehicle dashboard is the one shown below.
- Do you consider that this vehicle has a diagnostic socket? Justify your answer. (1.5marks)
 - Warning lamp 9 in **Figure 05** is displayed on the dashboard. Identify the warning and what it translates. (1.5marks)
 - The customer reported to the garage that his charging circuit was not playing its role. Identify the warning lamp which indicates it and explain how this warning behaves in this case. (3marks)
 - Complete the table below, identifying the following warning signals 1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 16, 17, 18, 19, 20, 21 and 22. (10marks)
 - Identify **FOUR** causes of the charging warning light lighting fault on this dashboard. (4marks)

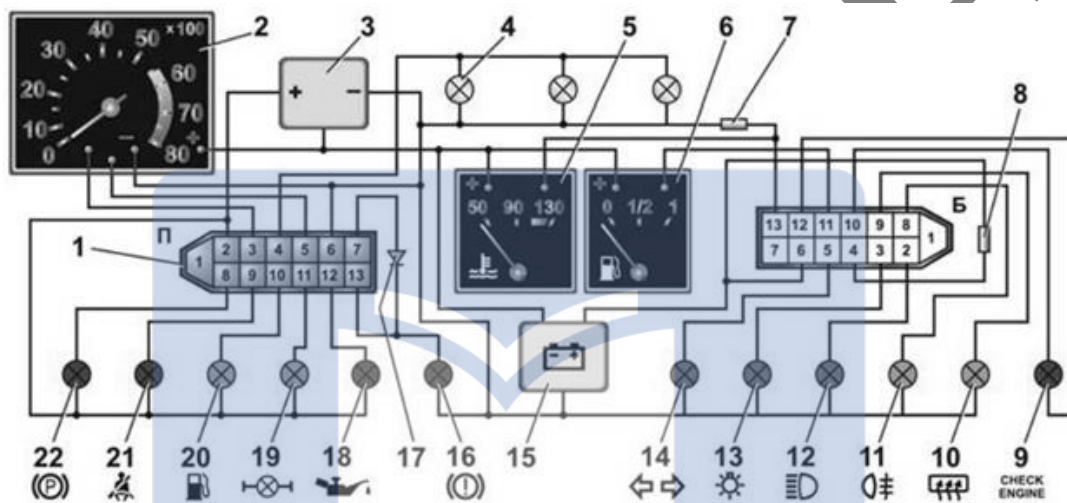


Figure: 05

TOTAL (20MARKS)

SECTION B: CALCULATION AND SCIENCE

Answer any TWO questions from this section

6. a. State **THREE (03)** effects when current is passed through a conductor. (6marks)
- b. A headlamp bulb carries this identification 12V/45W. What does this mean and calculate the current that can flow through the filament. (4marks)
- c. The voltage across the terminals of a generator supplying a 6cell 12V battery is 17.3V. The internal resistance of each cell is 0.1 ohms and current flowing in the circuit is 7 amps. Determine the effective voltage across the battery terminals (10marks)

TOTAL (20MARKS)

7. An engine requires a minimum cranking speed of 100 rev/min and the required torque to achieve this is 9.6Nm. At a 10:1 ring gear to pinion ratio, this will require a 1000 rev/min starter speed (n). The efficiency of the starter motor is 60% and the battery used is a 12 volt battery.
- Calculate the cranking power by the starter motor (6marks)
 - Calculate the input power (6marks)
 - Give **TWO** causes of the losses in power in the starter motor (4marks)
 - Determine the cranking current, rounding up to the nearest ten (4marks)

TOTAL (20MARKS)

8. The diagram given in **figure: 06** below is one type of an electrical circuit.

- a. Identify the type of circuit (1mark)
- b. Calculate the readings on the ammeter and voltmeters V_1 and V_2 when:
 - i) Switch A is closed and switch B is open; (4marks)
 - ii) Switch B is closed and switch A is open; (4marks)
 - iii) Both switches are closed (6marks)
- c. Calculate the resistance of the full circuit. (5marks)

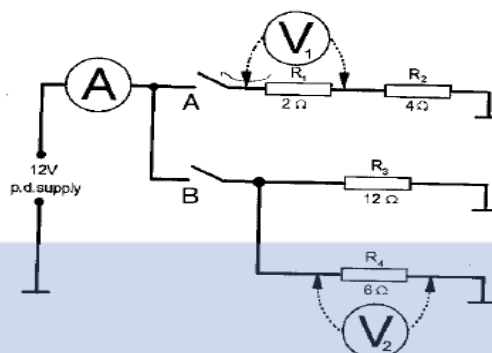


Figure: 06

TOTAL (20MARKS)