1503/205
ENGINE TECHNOLOGY AND
AUTO ELECTRICS
Oct./Nov. 2021
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

CRAFT CERTIFICATE IN MOTOR VEHICLE ENGINEERING

MODULE II

ENGINE TECHNOLOGY AND AUTO ELECTRICS

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:
Answer booklet;
Non-programmable scientific calculator.
*This paper consists of **EIGHT** questions in **TWO** sections; A and B.*
*Answer **FIVE** questions choosing at least **TWO** questions from each section.*
All questions carry equal marks.
Candidates should answer the questions in English.

This paper consists of 4 printed pages.

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

SECTION A: ENGINES

*Answer at least **TWO** questions from this section.*

1. (a) (i) State **two** advantages of synthetic oil over mineral oil.

(ii) Using a diagram, explain the operation of a splash oil lubrication system. (10 marks)

(b) Using a diagram, explain the operation of the crankcase ventilation system. (10 marks)

2. (a) Explain **two** operational differences between a spark ignition engine and a compression ignition engine. (4 marks)

(b) State **four** types of injector nozzles used in diesel engines. (4 marks)

(c) With the aid of a diagram, explain the operation of a pressure-time injector. (12 marks)

3. (a) State **two**:

(i) types of thermostats used on a motor vehicle cooling system.

(ii) functions of an anti-freeze in engine cooling.

(iii) disadvantages of water as a coolant. (6 marks)

(b) (i) Sketch the tube and fin radiator core indicating the flow of air and the coolant.

(ii) With the aid of a diagram, explain the operation of a viscous coupling cooling fan. (14 marks)

4. (a) State **two** advantages and **two** disadvantages of a gas turbine engine over a conventional compression ignition engine. (4 marks)

(b) Using a diagram, describe the operation of a gas turbine engine. (16 marks)

SECTION B: AUTO-ELECTRICS

Answer at least TWO questions from this section.

5. (a) Draw the symbol of each of the following electronic components and state their function:

(i) capacitor;
(ii) silicon controlled rectifier;
(iii) diode.

(6 marks)

(b) (i) With the aid of a circuit explain the operation of the transistor assisted ignition system. (14 marks)

6. (a) State:

(i) **three** advantage of multi point injection over throttle body injection.

(ii) **two** possible positions to locate petrol fuel injectors in an electronic fuel injection system.

(5 marks)

(b) With the aid of a schematic diagram, explain the operation of the K-jetronic continuous flow injection system. (15 marks)

7. (a) (i) State the function of each of the following components of a car air conditioning system:

(I) compressor;
(II) condenser;
(III) ventilation fan.

(ii) Sketch the thermostatic cycling switch and label its parts.

(6 marks)

(b) With the aid of a diagram, explain the operation of the air conditioning system of a car. (14 marks)

8. (a) (i) State **three** advantages of an electronic ignition system over the contact breaker point ignition system.

(ii) List **three** types of electric circuit protection devices.

(6 marks)

(b) Using a diagram, explain the operation of a rear window defroster system. (14 marks)

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