

1503/205
ENGINES AND AUTOELECTRICS
June/July 2023
Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL
CRAFT CERTIFICATE AUTOMOTIVE ENGINEERING
MODULE II

ENGINES AND AUTOELECTRICS

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:

Answer booklet;

Drawing instruments.

This paper consists of TWO sections; A and B.

Answer a total of FIVE questions, taking at least TWO questions from each section.

Maximum marks for each part of a question are as indicated.

Candidates should answer the questions in English.

This paper consists of 3 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: ENGINE TECHNOLOGY

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

1. (a) (i) State **two** requirements of engine oil.
(ii) Using a labelled diagram explain the operation of the gear type oil pump. (10 marks)
- (b) (i) State **two** advantages of air cooling system.
(ii) With the aid of a sketch of a sketch, explain the operation of a four-cylinder in-line engine air cooling system. (10 marks)
2. (a) State **three** advantages of Turbo-charging an engine. (3 marks)
- (b) (i) State **two** advantages and two disadvantages of diesel engines.
(ii) Using sketch(es), explain the operation of the pumping element of the in line fuel injection pump. (17 marks)
3. (a) (i) State **two** types of piston rings.
(ii) Explain **two** properties that a material used for manufacturing piston ring must possess. (6 marks)
- (b) State **two** methods used in cold starting a compression ignition engine. (2 marks)
- (c) Explain the operation of the four stroke compression ignition engine, using appropriate sketch(es) (12 marks)
4. (a) State **two** functions of a governor as used in an engine. (2 marks)
- (b) (i) Explain the following terms as applied to the distributor pump assembly (DPA) fuel system.
- transfer pressure;
- metering pressure.
(ii) With the aid of a sketch, explain the operation of the hydraulic governor used in the distributor fuel injection pump. (18 marks)

SECTION B: AUTOELECTRICS

Answer at least TWO questions from this section.

5. (a) State **four**;
- (i) Sources of radio interference;
 - (ii) Types of interference suppression devices. (8 marks)
- (b) Using a labelled sketch, explain the operation of the bimetallic fuel gauge. (12 marks)
- *6. (a) With the aid of a labelled sketch, explain the operation of the link type wiper mechanism. (8 marks)
- (b) With the aid of a sketch, explain the operation of a heating and ventilating system used in a vehicle. (12 marks)
- *7. (a) State **three** advantages of the electronic diesel control system of a vehicle. (3 marks)
- (b) Using a labelled sketch, explain the operation of the electronically controlled common rail diesel fuel injection system. (17 marks)
- *8. (a) State **four** disadvantages of the contact breaker coil ignition system. (4 marks)
- (b) Using a circuit layout, explain the operation of the transistor ignition system. (16 marks)

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