

1503/205
ENGINE TECHNOLOGY
AND AUTO ELECTRICS
June/July 2018
Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL
CRAFT CERTIFICATE IN AUTOMOTIVE ENGINEERING
MODULE II

ENGINE TECHNOLOGY AND AUTO ELECTRICS

3 hours

INSTRUCTIONS TO CANDIDATES

The candidate should have the following for this examination:

Answer booklet;

Drawing instruments.

This paper consists of EIGHT questions in TWO sections; A and B.

Answer a total of FIVE questions by choosing at least TWO questions from each section.

All questions carry equal marks.

Maximum marks to each part of a question are indicated.

Candidates should answer the questions in English.

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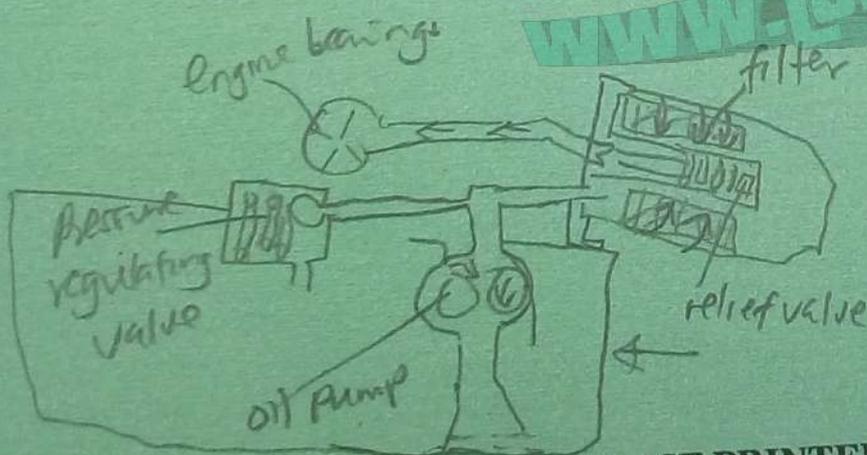
This paper consists of 3 printed pages.

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

SECTION B: AUTO ELECTRICS

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

- (a) State **two** advantages and **two** disadvantages of the electronic ignition system. (4 marks)
- (b) With the aid of a circuit diagram, explain the operation of the transistor ignition system of an engine. (16 marks)
- (a) (i) State **one** advantage and **one** disadvantage of sealed beam head lamp. (8 marks)
- (ii) Illustrate the construction of the sealed beam headlight. (8 marks)
- (b) With the aid of a sketch, explain the operation of the hot wire flasher unit. (12 marks)
- (a) State **four** functions of an air conditioner. (4 marks)
- (b) Using a labelled sketch, explain the operation of a vehicle air conditioning system. (16 marks)
- (a) State **two** advantages and **two** disadvantages of the electronic diesel control system. (4 marks)
- (b) With the aid of a sketch, explain the operations of the electronically controlled common rail injection system. (16 marks)



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SECTION A: ENGINE TECHNOLOGY

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

1. (a) Illustrate the following:

- (i) a bath-tub combustion chamber;
- (ii) a labelled valve timing diagram.

(10 marks)

(b) With the aid of a diagram, explain the operation of a magneto ignition system.

(10 marks)

2. (a) State **two** advantages and **two** disadvantages of gas turbine engine compared to the conventional engine.

(4 marks)

(b) Using a labelled diagram, explain the operation of a gas turbine engine.

(16 marks)

3. (a) (i) State **two** functions of the lubrication system.

(ii) Explain the function of any **two** oil additives.

(ii) State any **two** main sources from which lubricating oils are extracted from.

(8 marks)

(b) Illustrate a labelled sketch of the full flow filter.

(5 marks)

(c) With the aid of a labelled sketch, explain the operation of Bourdon type pressure gauge.

(7 marks)

4. (a) State **two** advantages and **two** disadvantages of water being used as a coolant in an engine.

(4 marks)

(b) Sketch the layout of air cooling in a four cylinder inline engine.

(5 marks)

(c) With the aid of a sketch, explain the operation of the wax thermostat.

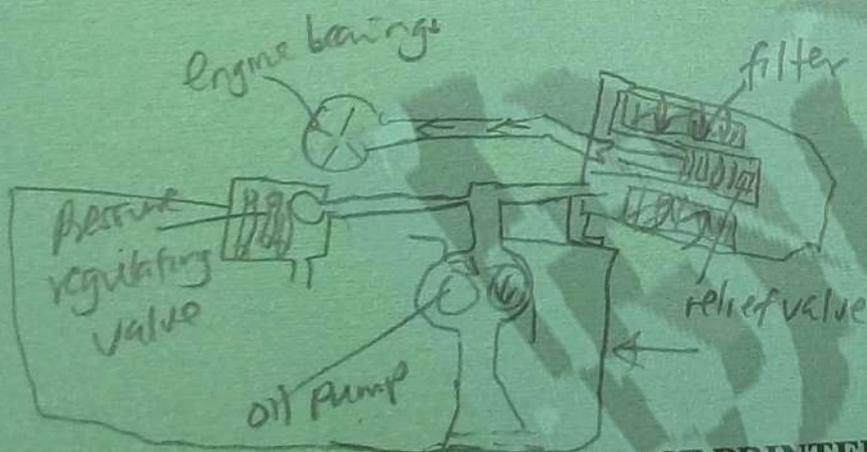
(11 marks)

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SECTION B: AUTO ELECTRICS

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

- (a) State **two** advantages and **two** disadvantages of the electronic ignition system. (4 marks)
- (b) With the aid of a circuit diagram, explain the operation of the transistor ignition system of an engine. (16 marks)
- (a) (i) State **one** advantage and **one** disadvantage of sealed beam head lamp. (8 marks)
- (ii) Illustrate the construction of the sealed beam headlight. (8 marks)
- (b) With the aid of a sketch, explain the operation of the hot wire flasher unit. (12 marks)
- (a) State **four** functions of an air conditioner. (4 marks)
- (b) Using a labelled sketch, explain the operation of a vehicle air conditioning system. (16 marks)
- (a) State **two** advantages and **two** disadvantages of the electronic diesel control system. (4 marks)
- (b) With the aid of a sketch, explain the operations of the electronically controlled common rail injection system. (16 marks)



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(11 marks)

High specific heat capacity
Hardens mechanical parts

