

2506/107
2507/107
AIRCRAFT PISTON ENGINES
March/April 2024
Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL
DIPLOMA IN AERONAUTICAL ENGINEERING
(AIRFRAMES AND ENGINES OPTION)
(AVIONICS OPTION)

MODULE I

AIRCRAFT PISTON ENGINES

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:

Answer booklet;

Drawing instrument;

Mathematical tables/Non-programmable scientific calculator

This paper consists of EIGHT questions.

Answer FIVE questions in the answer booklet provided.

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

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.

1. With the aid of a labelled sketch, explain the:
 - (a) horizontally opposed valve operating mechanism; (9 marks)
 - (b) operation of an aeropiston wet sump lubrication system. (11 marks)

2. With the aid of a labelled sketch, describe the operation of each of the following parts of an aircraft carburettor:
 - (a) accelerator pump; (10 marks)
 - (b) air bleed mixture control. (10 marks)

3. (a) Explain the operation of an aircraft magneto primary coil. (7 marks)
(b) Using a labelled sketch, explain the operation of an induction vibrator system. (13 marks)

4. (a) With the aid of a labelled sketch, describe the operation of a turbocharger waste gate actuator. (11 marks)
(b) Highlight the procedure of starting an aircraft piston engine fitted with TCM fuel injection system. (9 marks)

5. (a) Using a labelled sketch, highlight the procedure of performing a differential compression test on an aircraft engine. (12 marks)
(b) Highlight the procedure of performing each of the following checks on aircraft magneto system:
 - (i) dead cut;
 - (ii) single ignition. (8 marks)

6. (a) Using a labelled sketch, describe the operation of an aircraft starter fitted with a Bendix drive. (11 marks)
(b) Explain the fault analysis performed to each of the six aeropiston engine systems during trouble shooting process. (9 marks)

7. (a) With reference to aircraft piston engine exhaust system, explain the function and construction of each of the following:
 - (i) muffler;
 - (ii) augumenter tube. (8 marks)
(b) With the aid of labelled sketch, explain the construction and operation of a pressure cooling system of a horizontally opposed aircraft piston engine. (12 marks)

8. (a) With reference to valve opening and ignition timing, explain each of the following:
- (i) inlet valve lead/lag;
 - (ii) exhaust valve lead/lag;
 - (iii) valve overlap. (12 marks)
- (b) With reference to the firing order of an 18-cylinder double row radial engine:
- (i) show the arrangement of the cylinders;
 - (ii) highlight the steps of determining the firing order;
 - (iii) determine the firing order. (8 marks)

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