2506/107
2507/107
AIRCRAFT PISTON ENGINES
June/July 2019
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN AERONAUTICAL ENGINEERING (AIRFRAMES AND ENGINES OPTION) DIPLOMA IN AERONAUTICAL ENGINEERING (AVIONICS OPTION)

MODULE I

AIRCRAFT PISTON ENGINES

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:
Answer booklet;
Drawing instruments;
Mathematical tables/Non-programmable scientific calculator.
*This paper consists of **EIGHT** questions.*
*Answer **FIVE** questions in the answer booklet provided.*
All questions carry equal marks.
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.

1. (a) With the aid of sketches, describe the cylinder numbering of each of the following types of aeropiston engines:

(i) 18-cylinder twin row radial engine;

(ii) 4-cylinder inline engine;

(iii) 8-cylinder V-type engine.

(12 marks)

(b) With the aid of sketches, explain the processes of determining the firing order of an 18-cylinder radial double row engine starting with cylinder No. 1. (8 marks)

2. With the aid of labelled cross-sectional sketch, describe the construction of a hydraulic valve lifter. (20 marks)

3. (a) Calculate the:

(i) indicated horsepower for a six-cylinder engine with a bore of five inches, a stroke of five inches thriving at 2,750 r.pm and with an IMEP of 125 p.s.i per cylinder; (4 marks)

(ii) brake horsepower for an engine that develops 600 foot-pounds of torque while turning at 2,700 r.p.m; (4 marks)

(iii) brake thermal efficiency of a piston engine that produces 150 brake horsepower while burning 8 gallons of aviation gasoline per hour. (5 marks)

(b) With the aid of a labelled sketch, describe the prony brake dynamometer used to measure engine torque. (7 marks)

4. (a) Explain each of the following range markings arcs on engine instruments:

(i) green;

(ii) yellow;

(iii) red;

(iv) blue.

(8 marks)

(b) With the aid of a labelled sketch, explain the operation of a mechanical tachometer. (8 marks)

(c) Outline **four** types of aircraft reciprocating engine instruments other than tachometer. (4 marks)

5. (a) Highlight the procedure for carrying out each of the following during aeropiston engine maintenance:

(i) ground run; (10 marks)

(ii) compression test. (7 marks)

(b) Outline **three** reasons why serviceable aircraft engine is removed from the aircraft. (3 marks)

6. With the aid of a labelled sketch, explain:

(a) operational difference between full flow and bypass filtration system; (12 marks)

(b) construction of a spur gear oil pump. (8 marks)

7. With the aid of labelled sketches, describe the construction and operation of each of the following carburettor systems:

(a) diffuser; (9 marks)

(b) slow running. (11 marks)

8. With the aid of a labelled circuit diagram, describe the construction and operation of an aeropiston electrical high tension magneto circuits. (20 marks)

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