

2506/107

2507/107

**AIRCRAFT PISTON  
ENGINES**

**June/July 2018**

**Time: 3 hours**



**THE KENYA NATIONAL EXAMINATIONS COUNCIL**

**DIPLOMA IN AERONAUTICAL ENGINEERING  
(AIRFRAMES & 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 instruments.*

*Answer FIVE of the following EIGHT questions.*

*All questions carry equal marks.*

*Maximum marks for each part of a question are 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) Outline **four** requirements of a cylinder. (4 marks)
- (b) Explain the functions of each of the **three** types of piston rings. (6 marks)
- (c) Determine the firing order of an 18-cylinder double row radial aeropiston engine. (10 marks)
2. (a) With the aid of a labelled sketch, describe the operation of a turbocharger. (10 marks)
- (b) Outline **five** causes and their remedies on the induction system if the engine runs rough. (10 marks)
3. (a) With the aid of a labelled schematic sketch:
- (i) show the schematic layout of the basic components of a basic battery ignition system; (6 marks)
- (ii) describe the primary electrical circuit of a high tension magneto. (8 marks)
- (b) (i) Outline **two** advantages of using a dual magneto. (2 marks)
- (ii) List **two** main factors considered when replacing the magnetos on an aeropiston engine. (4 marks)
4. (a) (i) Outline **three** reasons why the oil used in reciprocating engines has a relatively high viscosity. (3 marks)
- (ii) Differentiate between each of the following:
- (I) flash point and fire point;
- (II) cloud point and pour point. (4 marks)
- (b) With the aid of a labelled sketch, show the construction of a wet sump lubrication system. (7 marks)
- (c) Highlight the procedure for the removal of a typical dry sump oil tank. (6 marks)



5. (a) Describe the **two** general types of exhaust systems used in aeropiston engines. (4 marks)
- (b) Discuss aeropiston engines exhaust system failures under each of the following headings:
- (i) muffler and heat exchanger;
  - (ii) exhaust main fold and stack;
  - (iii) internal muffler;
  - (iv) augmentor exhaust system.
- (16 marks)

6. (a) Describe ground running as applied to aeropiston engines. (2 marks)
- (b) Explain the function of each of the following aircraft engine monitoring instruments:
- (i) ammeter;
  - (ii) cylinder temperature gauge;
  - (iii) exhaust gas temperature gauge;
  - (iv) vacuum gauge.
- (4 marks)

- (c) Highlight the precautions to be observed during aircraft engine ground run. (14 marks)

7. (a) Describe the **three** categories of inspection of engine parts during overhaul. (6 marks)
- (b) Describe each of the following defects with respect to aeropiston engines:
- (i) flaking;
  - (ii) fretting;
  - (iii) galling;
  - (iv) gouging;
  - (v) grooving.
- (5 marks)

- (c) Highlight the general procedure for inspecting and reconditioning piston engine cylinders. (9 marks)

8. (a) List **four** main parts of a pressure engine carburettor. (2 marks)
- (b) Describe the main sub-systems of a float-type carburettor for an aeropiston engine. (18 marks)

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