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) List **four** types of oil filters used in aeropiston engines. (2 marks)
   (b) With the aid of a labelled diagram, explain the construction and operation of aeropiston engine oil cooler. (18 marks)

2. (a) Outline **two** main functions of engine cowling. (2 marks)
   (b) Discuss each of the following with reference to aeropiston engine cooling system:
      (i) cylinder baffle and deflector system; (7 marks)
      (ii) cylinder temperature indicating system; (6 marks)
      (iii) engine cooling inspection. (5 marks)

3. (a) With the aid of a labelled cross-sectional sketch, show the parts of a typical aircraft engine spark plug. (8 marks)
   (b) Highlight the procedure for replacing a single ignition lead cable for a six cylinder aero piston engine. (12 marks)

4. (a) With the aid of a labelled sketch, show the valve operating mechanism for a radial engine. (10 marks)
   (b) With the aid of sketches, describe the **three** main types of bearings used in aeropiston engines under the following heading:
      (i) types; (3 marks)
      (ii) application; (4 marks)
      (iii) subjected loads. (3 marks)

5. (a) Describe the safety precautions to be observed during aeropiston engine ground run. (15 marks)
   (b) Explain **five** functions of aeropiston engine monitoring instruments. (5 marks)

6. (a) Describe each of the following defects in engine parts:
      (i) scuffing; (5 marks)
      (ii) pitting;
      (iii) scoring;
      (iv) scratches;
      (v) stains.
   (b) Explain the procedure for performing dye penetrant inspection on engine parts. (15 marks)
7. (a) Explain four types of fire extinguishers applicable to aeropiston engines. (8 marks)
(b) Outline six checks to be carried out on fire extinguishers bottles. (3 marks)
(c) With regards to aviation fuels, explain each of the following:
   (i) calorific value;
   (ii) AVGAS;
   (iii) AVTUR. (3 marks)
(d) Discuss impulse coupling with respect to aeropiston engine starting systems. (6 marks)

8. (a) With the aid of a labelled schematic sketch, show the basic components of fuel injection system. (5 marks)
(b) State six advantages and four disadvantages of fuel injection system over carburetor fuel system. (5 marks)
(c) Highlight the procedure for carburetor removal during maintenance. (10 marks)