THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN AERONAUTICAL ENGINEERING (AIRFRAMES AND ENGINES OPTION)

MODULE III

GAS TURBINE ENGINE

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:
Answer booklet;
Drawing instruments;
Mathematical table/Non programmable scientific calculator.
*This paper consists of **EIGHT** questions.*
*Answer **FIVE** of the **EIGHT** 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. (a) Explain why anti-friction bearings are preferred for use on gas turbine engines. (8 marks)

(b) Describe each of the following seals used on gas turbine engines:

(i) ring;

(ii) hydraulic;

(iii) carbon;

(iv) brush. (12 marks)

2. (a) Explain the various characteristics of fuel used on gas turbine engines. (8 marks)

(b) With the aid of sketches, describe the spray pattern of fuel nozzle on low, intermediate, and high fuel pressures. (6 marks)

(c) Outline **six** functions of gas turbine engine internal air system. (6 marks)

3. (a) With the aid of a labelled sketch, show the cross-section of a typical igniter plug used on gas turbine engine. (5 marks)

(b) Discuss each of the following types of gas turbine engine starters:

(i) electric;

(ii) cartridge;

(iii) iso-propyl nitrate;

(iv) air;

(v) hydraulic.

(15 marks)

4. Describe each of the following gas turbine engine anti-icing systems:

(a) hot air. (12 marks)

(b) electric. (8 marks)

5. With reference to gas turbine exhaust systems describe each of the following and illustrate your answers:

(a) jet pipe; (10 marks)

(b) re-heat engine. (10 marks)

6. (a) Explain **six** properties of an ideal gas turbine engine lubricating oil. (6 marks)

(b) With the aid of a labelled sketch, describe the construction and operation of a gear type pump for use on gas turbine engine lubrication system. (9 marks)

(c) Highlight the servicing procedure for a typical gas turbine engine oil filter. (5 marks)

7. Explain the function and operation of each of the following gas turbine engine instruments and parameters:

(a) engine pressure ratio; (5 marks)

(b) tachometer; (5 marks)

(c) exhaust gas temperature; (5 marks)

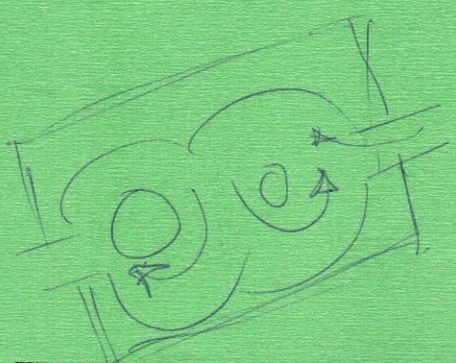
(d) engine flow and oil pressure indicator. (5 marks)

8. Explain how each of the following factors affect gas turbine engine performance:

(a) altitude; (6 marks)

(b) temperature; (6 marks)

(c) forward speed. (8 marks)



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