2506/304
GAS TURBINE ENGINE
Oct./Nov. 2019
Time: 3 hours

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 tables/Non programmable scientific calculator.
*This paper consists of **EIGHT** questions.*
*Answer **FIVE** questions.*
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.

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1. With the aid of labelled sketches, show each of the following with reference to a turbojet engine:

   (a) fuel system; (7 marks)

   (b) construction of a pressure control system. (13 marks)

2. (a) With reference to turbine engine fire protection system, discuss each of the following:

   (i) fire extinguisher bottles; (5 marks)
   (ii) discharge valves. (5 marks)

   (b) Describe the inspection checks carried out on a continuous loop fire detection system. (10 marks)

3. (a) With the aid of a labelled sketch, describe the construction and principle of operation of a typical engine oil tank. (13 marks)

   (b) Explain the operation of a gas turbine engine total loss oil system. (7 marks)

4. (a) With the aid of a graph, show the propulsive efficiencies of various types of gas turbine engine used on aircraft. (7 marks)

   (b) With the aid of labelled sketches, describe the operation of a turbo ramjet at each of the following mach numbers:

   (i) Low (M 0.85);
   (ii) High (M 1.5)

   (13 marks)

5. Discuss each of the following ice protection systems on a turbojet engine:

   (a) hot air; (11 marks)

   (b) electrical. (9 marks)

6. With reference to gas turbine engine cooling:

   (a) discuss using a labelled sketch, the application of insulation blanket on exhaust system. (12 marks)

   (b) describe the cooling of the combustion section. (8 marks)

7. (a) With the aid of a labelled sketch, describe the construction of a typical air turbine engine starter. (11 marks)

(b) Highlight **three** causes, and remedies of each of the following pneumatic starter faults:

(i) starter does not operate (no rotation);

(ii) starter will not accelerate to normal cut-off speed;

(iii) starter will not cut-off.

(9 marks)

8. Discuss each of the following with reference to gas turbine engine maintenance:

(a) field cleaning; (10 marks)

(b) engine trimming. (10 marks)

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