2506/304
GAS TURBINE ENGINES
Oct./Nov. 2021
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN AERONAUTICAL ENGINEERING (AIRFRAMES AND ENGINES OPTION)

MODULE III

GAS TURBINE ENGINES

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:
Answer booklet;
Scientific non-programmable calculator;
Drawing instruments.
*This paper consists of **EIGHT** questions.*
*Answer **FIVE** questions in the answer booklet provided.*
All questions carry equal marks.
Maximum marks for each 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. With the aid of labelled sketches, discuss:

   (a) aero turboprop engine; (10 marks)

   (b) thermal pneumatic anti-icing method applied to jet engine air intakes. (10 marks)

2. (a) With the aid of labelled sketches:

      (i) show the sequence of performing pre-start ground checks for a four engine aircraft;

      (ii) highlight the tasks involved in (a)(i). (9 marks)

   (b) Explain the distribution of the airflow through a combustion chamber. (11 marks)

3. (a) With the aid of sketches, show the flow of oil and sealing air for each of the **three** labyrinth seals as applied to aerogas turbine engines. (9 marks)

   (b) With reference to engine speed governors, describe the operation of the turbo propeller engine pressure control fuel system. (11 marks)

4. (a) With the aid of a labelled sketch, describe the construction and operation of the helical epicyclical gear used on turbo propeller. (11 marks)

   (b) With the aid of a labelled cross sectional sketch, explain the construction of the thermal switch fire detector. (9 marks)

5. (a) With reference to gas turbine engine storage and shipping procedure, explain each of the following fuel system inhibiting methods:

      (i) motoring;
      (ii) pressure rig;
      (iii) gravity. (12 marks)

   (b) Discuss reverse thrust selection and safety features for a jet engine. (8 marks)

6. With the aid of a labelled compression vs expansion graph, discuss the aero gas turbine engine pressure ratio. (2 0 marks)

7. With the aid of a labelled schematic diagram, explain the operation of the APU bleed air valve with APU operating above 95% condition - ready to load. (20 marks)

8. With reference to gas turbine engine air system, discuss each of the following:

(a) internal cooling; (5 marks)

(b) external cooling and ventilation; (5 marks)

(c) engine off-takes; (5 marks)

(d) active clearance control. (5 marks)

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