2506/304
GAS TURBINE ENGINE
June / July 2023
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN AERONAUTICAL ENGINEERING (AIRFRAME 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.
*This paper consists of **EIGHT** questions.*
*Answer **FIVE** of the **EIGHT** questions in the answer booklet provided.*
All questions carry equal marks.
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.

Turn over

1. (a) Describe each of the following with reference to gas turbine engine performance:

(i) combustion intensity; (4 marks)

(ii) combustion stability. (6 marks)

(b) Outline **ten** precautions to be observed during turbine engine ignition system servicing. (10 marks)

2. With the aid of labelled sketches, describe the construction and operation of each of the following types of gas turbine engine seals:

(a) carbon; (11 marks)

(b) labyrinth. (9 marks)

3. (a) Differentiate between aerodynamic action and jet reaction thrust generation methods. (4 marks)

(b) With the aid of labelled sketches, explain the operation of each of the following turbine blade designs:

(i) impulse;
(ii) reaction.

(16 marks)

4. (a) With the aid of a labelled sketch, explain the principle of operation of a thermocouple as applied in gas turbine engines indication system. (15 marks)

(b) Explain the function and operation of synchro scopes as used in multi-engine tachometers. (5 marks)

5. (a) With the aid of a labelled sketch, describe the operation of a gas turbine engine nacelle and compressor cooling. (12 marks)

(b) With reference to gas turbine air systems, discuss each of the following:

(i) hot gas ingestion;

(ii) accessory cooling.

(8 marks)

6. (a) With the aid of a labelled schematic diagram, describe the operation of an air turbine starter.

(12 marks)

(b) With the aid a labelled sketch, explain the operation of a low voltage shunted gap igniter. (8 marks)

7. (a) With the aid of a labelled sketch, describe the construction and operation of a Lindberg pneumatic continuous loop fire detection system. (16 marks)

(b) Explain the **four** classes of gas turbine engine fire. (4 marks)

8. Discuss each of the following with reference to commercial aircrafts ETOPs maintenance:

(a) engine health monitoring; (16 marks)

(b) pre-departure service check. (4 marks)

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