

2506/304
GAS TURBINE ENGINE
June/July 2019
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;

Mathematical tables/ Non-programmable scientific calculator.

This paper consists of EIGHT questions.

Answer FIVE questions in the answer booklet provided.

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.

1. (a) With reference to engine indicating system maintenance, highlight the functions of a jet calibration test unit. (8 marks)
- (b) State the safety precautions to be observed when working with a jet calibration unit. (6 marks)
- (c) Explain each of the following terms as applied to gas turbine engine maintenance:
- (i) blending;
 - (ii) blistering;
 - (iii) compression;
 - (iv) creep;
 - (v) static balance;
 - (vi) untwist.
- (6 marks)
2. (a) With reference to gas turbine fire protection systems, discuss each of the following:
- (i) fire bottle pressure indications; (5 marks)
 - (ii) discharge indicators. (7 marks)
- (b) With the aid of a labelled exploded view, show the construction of a typical fire engine extinguisher bottle. (8 marks)
3. (a) With the aid of a labelled cross-sectional sketch, describe the construction of a gear type engine oil pump. (13 marks)
- (b) Describe how the oil pressure is regulated during engine operation in a gas turbine engine. (7 marks)
4. (a) With the aid of a labelled sketch, explain the construction and operation of a rocket engine. (7 marks)
- (b) With the aid of a labelled Bryton cycle, describe the operation of a gas turbine engine. (13 marks)
5. (a) Show and label the typical cycling sequence charts on a turboprop engine electrical ice protection system. (5 marks)
- (b) Tabulate the probable causes, what to check for, and the remedy, for each of the following in a gas turbine engine anti-icing system:
- (i) ice forms in the inlet with the anti-icing system turned on;
 - (ii) compressor stalls at high power setting with the anti-icing system off;
 - (iii) engine unable to attain full power (at EGT limit);
 - (iv) fluctuating EGT and RPM;
 - (v) ERP rise (flight).
- (15 marks)

6. (a) With the aid of a labelled sketch, describe the gas turbine nacelle cooling. (10 marks)
- (b) Discuss cooling on a typical gas turbine engine turbine section. (10 marks)
7. With the aid of a labelled sketch, explain the construction and operation of a pneumatic starter air supply valve. (20 marks)
8. With the aid of labelled sketches, show each of the following with reference to a turbopropeller engine:
- (a) fuel system flow; (7 marks)
- (b) fuel control system layout. (13 marks)

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