2107/305
AIRFRAME TECHNOLOGY
June/July 2018
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN AERONAUTICAL ENGINEERING (AIRFRAMES AND ENGINES OPTION)

AIRFRAME TECHNOLOGY

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** 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.

1. (a) Explain:

(i) **two** ways that would cause shock loads on an aircraft structure;
(ii) classification of aircraft structural failure conditions in relation to their effect on aircraft and its occupants. (8 marks)

(b) Explain how each of the following factors affects aircraft materials and structures on ground:

(i) aircraft landing;
(ii) friction;
(iii) pressurization;
(iv) braking. (4 marks)

(c) Outline **five** advantages of aircraft composite materials. (8 marks)

2. (a) Describe each of the following:

(i) the aircraft structural repair manual;
(ii) a typical structural repair manual numbering system. (9 marks)

(b) With the aid of the structural repair flow chart, highlight the aircraft damage repair procedure. (11 marks)

3. (a) With the aid of a labelled sketch, explain the:

(i) operation of an electric trim actuator;
(ii) trim function for powered flight control unit operated controls. (18 marks)

(b) Outline the requirements for powered trim system. (2 marks)

4. (a) Outline **eight** requirements of aviation fuel. (8 marks)

(b) Explain the importance of each of the following fuel additives:

(i) antioxidants;
(ii) corrosion inhibitor/lubricity improver. (4 marks)

(c) Outline the measures undertaken to ensure aircraft fuel control. (8 marks)

5. With the aid of a labelled sketch, describe the construction and operation of the aircraft hydraulic system variable volume pump. (20 marks)

6. (a) Explain the function of each of the following components as applied to the aircraft landing gear:

(i) trunnion;
(ii) structural fuses. (2 marks)

(b) Explain the purpose of each of the following aircraft wheel components:

(i) tyre inflation valve;
(ii) over-pressure relief valve;
(iii) tyre pressure sensor;
(iv) thermal fuse plugs. (4 marks)

(c) (i) Describe the inspections carried out on the aircraft wheels in installed wheel situation.

(ii) Outline **six** risks associated with inflating tyres with air in accordance with air notices. (14 marks)

7. (a) Outline **seven** effects of ice accumulation on aircraft. (7 marks)

(b) Other than thermal methods, explain **three** other primary methods used for aerofoil ice protection. (6 marks)

(c) With the aid of a cross-section diagram, explain a typical leading edge thermal ice protection. (7 marks)

8. With the aid of a labelled sketch, show the layout of a typical blower air conditioning system. (20 marks)

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