

2107/305

AIRFRAME TECHNOLOGY

Oct./Nov. 2011

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;

Mathematical tables/Non-programmable calculator;

Drawing instruments.

Answer any FIVE of the following EIGHT questions.

ALL questions carry equal marks.

Maximum marks for each part of a question are as indicated.

This paper consists of 4 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) Describe the following properties of metals and explain the reasons that make them best suited for aircraft construction:
- (i) conductivity;
 - (ii) malleability;
 - (iii) toughness.
- (6 marks)
- (b) Differentiate between the following terms as applied to aircraft repair scheme:
- (i) jigs and fixtures;
 - (ii) relief holes and stop drilling;
 - (iii) countersinking and dimpling.
- (6 marks)
- (c) With the aid of a graph, discuss the Hooke's Law on testing aircraft material leading to fatigue failure. (8 marks)
2. (a) Describe each of the following defect on aircraft wheel braking system:
- (i) creep;
 - (ii) dragging brakes;
 - (iii) excessive brake pedal travel.
- (6 marks)
- (b) Explain the function of each of the following aircraft landing gear devices:
- (i) servo actuator;
 - (ii) shuttle valve;
 - (iii) double actuating cylinder.
- (6 marks)
- (c) State the correct procedure of changing the aircraft main wheel on the ramp. (8 marks)
3. (a) Explain the **three** classification of fuel carried out on any aircraft for a particular flight range. (6 marks)
- (b) With the aid of sketches, describe the construction of the **three** types of aircraft fuel tanks. (9 marks)
- (c) State the precautions to be observed when pressure defuelling a wide body aircraft. (5 marks)
4. (a) Outline the methods used for the identification of oxygen system components. (5 marks)

- (b) Describe the **three** types of oxygen systems used on aircraft. (6 marks)
- (c) With the aid of sketch, explain the construction and operation of a diluter demand oxygen regulator. (9 marks)
5. (a) Outline the functions of an accumulator in an aircraft hydraulic system. (5 marks)
- (b) Explain the 'condition maintenance tasks' carried out on the following aircraft hydraulic system devices:
- (i) sight glass; ✓
 - (ii) filters;
 - (iii) clogging pin. ✓
- (6 marks)
- (c) With the aid of a labelled line diagram, show the component layout of an aircraft typical hydraulic system. (9 marks)
6. (a) Outline the inspections undertaken to render aircraft cable control system airworthy. (5 marks)
- (b) Illustrate each of the following types of aircraft balance controls.
- (i) mass balance;
 - (ii) aerodynamic balance;
 - (iii) servo system.
- (6 marks)
- (c) Discuss the following maintenance tasks on an aircraft:
- (i) duplicate inspection;
 - (ii) symmetric checks;
 - (iii) module.
- (9 marks)
7. (a) Outline the objectives of aircraft painting and finishes. (5 marks)
- (b) Explain each of the following terms associated with incorrect application and give the correct remedy of each:
- (i) runs and sags;
 - (ii) orange peel;
 - (iii) blisters.
- (6 marks)

(c) With the aid of a sketch, describe the sequence of finishing of a metal aircraft surface.

(9 marks)

8. (a) Discuss each of the following types of aircraft fires areas in accordance to National Fire Protection Association and safety awareness of Civil Aviation Authorities:

- (i) cabin;
- (ii) engine;
- (iii) electrical bay;
- (iv) aircraft holds.

(20 marks)