

2506/106

2507/106

AIRFRAME STRUCTURES,
AIRFIELD SAFETY AND
PROCEDURES

June/July 2019

Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN AERONAUTICAL ENGINEERING
(AIRFRAMES AND ENGINES OPTION)
(AVIONICS OPTION)

MODULE I

AIRFRAME STRUCTURES, AIRFIELD SAFETY AND PROCEDURES

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:

Drawing instruments;

Mathematical tables/Non-programmable calculator;

Drawing instruments.

This paper consists of EIGHT questions in THREE sections; A, B and C.

Answer THREE questions from section A and ONE question each from sections B and C in the answer booklet provided.

All questions carry equal marks.

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

Candidates should answer the questions in English.

This paper consists of 5 printed pages.

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

SECTION A: AIRFRAME STRUCTURES

Answer THREE questions from this section.

1. (a) With the aid of a labelled chart, show the classification of aircraft. (10 marks)
- (b) With the aid of sketches, describe the major structural stresses acting on the aircraft fuselage. (10 marks)
2. (a) Differentiate between each of the following with reference to landing gear:
 - (i) tri-cycle and conventional;
 - (ii) fixed and retractable;
 - (iii) skids and floats.(6 marks)
- (b) Highlight **three** advantages of a tricycle landing gear. (3 marks)
- (c) Outline **six** reasons for use of magnesium alloy in landing gear construction. (3 marks)
- (d) With reference to nose landing gear assembly:
 - (i) sketch and label the assembly;
 - (ii) explain the function of each of the following:
 - (I) trunnion;
 - (II) torque links;
 - (III) shimmy damper.(8 marks)
3. (a) With the aid of labelled sketches:
 - (i) Explain the operation of a manually operated elevator control mechanism. (10 marks)
 - (ii) Show the construction of an elevator hydro-mechanical system. (6 marks)
- (b) Discuss the replacement of control cables during maintenance. (4 marks)

4. (a) With reference to ATA Chapter 51;
- (i) name the chapter;
 - (ii) outline the sections of the chapter.
- (10 marks)
- (b) Highlight the types of information required before maintenance. (6 marks)
- (c) Define each of the following terms as applied to aircraft maintenance:
- (i) alterations;
 - (ii) major repair;
 - (iii) minor repair;
 - (iv) heavy maintenance.
- (4 marks)

SECTION B: AERODYNAMICS

Answer ONE question from this section.

5. (a) Describe the hazards associated with each of the following in flight:
- (i) crosswind;
 - (ii) turbulence;
 - (iii) thunderstorm.
- (6 marks)
- (b) Differentiate between each of the following as applied to triangle of velocities:
- (i) course and heading;
 - (ii) drift angle and wind correction angle;
 - (iii) air speed and ground speed.
- (6 marks)
- (c) An aircraft is to be flown from point A to B 090° (EAST). Wind at the altitude of the intended flight is 40 knots from North east (045°). The true speed of the aircraft is 120 knots. Using the triangle of velocities determine:
- (i) heading;
 - (ii) wind correction;
 - (iii) ground speed.
(Use a scale of 1 cm = 10 knots)
- (8 marks)

6. (a) Differentiate between each of the following with regard to aerofoil nomenclature:
- (i) chordline and chord;
 - (ii) camber and mean camber;
 - (iii) aspect ratio and fineness ratio. (6 marks)
- (b) (i) With reference to aerofoil design, explain the NACA five-digit aerofoil series, using an example of NACA 23012. (5 marks)
- (ii) With reference to the four digit NACA series aerofoil shape, outline **three**
- (I) advantages;
 - (II) disadvantages;
 - (III) applications. (9 marks)

SECTION C: AIRFIELD SAFETY AND PROCEDURES

Answer ONE question from this section.

7. (a) Differentiate between each of the following types of laws:
- (i) civil and criminal;
 - (ii) common and constitutional;
 - (iii) international and aviation. (6 marks)
- (b) With reference to Paris Aviation Convention of 1919:
- (i) Describe the historical background; (6 marks)
 - (ii) Outline the **four** principles that governed in drafting; (4 marks)
 - (iii) List **eight** chapters. (4 marks)

8. With reference to aircraft ground handling, highlight the precautions to be observed:

(a) prior to refuelling an aircraft; (10 marks)

(b) during refuelling. (10 marks)

THIS IS THE LAST PRINTED PAGE.