

2507/307

**AUTOMATIC PILOT SYSTEM AND
AIRFIELD SAFETY AND PROCEDURES III**

June/July 2023

Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL

**DIPLOMA IN AERONAUTICAL ENGINEERING
(AVIONICS OPTION)**

MODULE III

**AUTOMATIC PILOT SYSTEM AND AIRFIELD SAFETY
AND PROCEDURES III**

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:

Answer booklet;

Drawing instruments.

This paper consists of EIGHT questions in TWO sections; A and B.

Answer THREE questions from section A and TWO questions from section B 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 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.**

SECTION A: AUTOMATIC PILOT SYSTEM

Answer THREE questions from this section.

1. (a) With the aid of a labelled sketch, explain the principle of flight control movements. (6½ marks)
- (b) Describe **three** aircraft auto flight control system classifications. (7½ marks)
- (c) Describe the channel response to an outer loop 10 degrees pitch up command. (6 marks)
2. (a) With the aid of a labelled schematic diagram, explain the operation of an autopilot pitch control. (15 marks)
- (b) Discuss the function and testing of autopilot computers. (5 marks)
3. With reference to autopilot fail safe system:
 - (a) draw a labelled schematic diagram to show the fail safe passive system; (13 marks)
 - (b) explain the principle of its operation. (7 marks)
4. (a) With the aid of a simple system diagram, explain the autopilot modular stability augmentation system. (18 marks)
- (b) Outline the function of the servo motor of the electric power unit of aircraft autopilot systems. (2 marks)
5. (a) Explain **three** integrity requirements and failure response for the autopilot loops. (6 marks)
- (b) With the aid of a labelled block diagram, explain the signal sources of the aircraft autopilot system. (14 marks)

SECTION B: AIRFIELD SAFETY AND PROCEDURES III

Answer TWO questions from this section.

6. (a) Outline the classification of certificates of airworthiness. (4 marks)
- (b) Explain the conditions that must be met for an application for the registration of an aircraft in Kenya to be made on behalf of the owner. (5 marks)

- (c) With reference to aircraft maintenance regulations:
- (i) highlight the persons authorized to perform maintenance, preventive maintenance and modification on an aircraft; (4 marks)
 - (ii) highlight the information recorded in the maintenance record, when a person approving the return to service of an aircraft or aircraft component after any inspection performed in accordance with the Civil Aviation (Operation of aircraft) Regulations 2018. (7 marks)

7. (a) With reference to aircraft accident and incident investigations, discuss the:
- (i) assistance given to survivors and their families by the investigators in charge; (3 marks)
 - (ii) form and conduct of investigations. (7 marks)
- (b) With reference to aviation quality systems, define quality and explain its three elements. (10 marks)

8. (a) With reference to aircraft crash and rescue:
- (i) discuss the requirements for an aircraft equipment with portable fire extinguisher to operate; (6 marks)
 - (ii) fill in the spaces shown in table 1. (4 marks)

Table 1

| | Maximum approved passenger seating configuration | Number of extinguishers |
|-----|--|-------------------------|
| (a) | 7 - 30 | |
| (b) | 31 to 60 | |
| (c) | 61 to 200 | |
| (d) | 201 to 300 | |
| (e) | 301 to 400 | |
| (f) | 401 to 500 | |
| (g) | 501 to 600 | |
| (h) | 601 and more | |

- (b) With reference to aviation stores procedures:
- (i) highlight **five** advantages of a centralized store; (5 marks)
 - (ii) discuss requisition and issuing of parts. (5 marks)

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