

2507/307

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

Oct./Nov. 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;

Mathematical tables/ Non programmable calculator.

*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 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.**

SECTION A: AUTOMATIC PILOT SYSTEM

Answer **THREE** questions from this section.

1. With the reference to autothrottle system, explain each of the following:
 - (a) operation; (14 mark)
 - (b) the condition which must be met for the take-off mode to be engaged. (3 marks)
 - (c) thrust reference mode selection conditions which must be in effect for the operation to be engaged. (3 marks)
2. (a) Describe how the automatic pitch trim functions on an aircraft. (6 marks)
(b) With aid of labelled sketches, explain each of the following types of trim tabs:
 - (i) anti-balance;
 - (ii) servo. (14 marks)
3. Explain how modern aircrafts fly-by-wire control laws system prevent the aircraft from exceeding limits under the following headings:
 - (a) speed; (4 marks)
 - (b) pitch attitude; (4 marks)
 - (c) bank angle; (4 marks)
 - (d) load factor; (4 marks)
 - (e) angle of attack. (4 marks)
4. (a) Compare between autopilot and attitude types of flight control inputs. (6 marks)
(b) Explain piloting law as applied to helicopter stabilization. (4 marks)
(c) With aid of labelled block diagram, describe auto trim based on the piloting law operation. (10 marks)
5. With reference to automatic flight system components, describe the construction and operation of each of the following:
 - (a) one channel computer; (7 marks)
 - (b) air navigation computer. (13 marks)

SECTION B: AIRFIELD SAFETY AND PROCEDURES III

Answer TWO questions from this section.

6. With reference to KCARs rules and regulations, explain what governs each of the following:
- (a) airworthiness directives and service bulletins. (6 marks)
 - (b) choice of facility during accident investigations. (7 marks)
 - (c) non-disclosure of accident investigation records. (7 marks)
7. With reference to KCARs part VII on crash and rescue, highlight the requirements as detailed in:
- (i) regulation (43) and sub-regulation (1) for emergency and flotation equipment; (5 marks)
 - (ii) regulation (49) and sub-regulation (1), (2), (3), (4), (5), (6), (7), (8) and (9) for the emergency locator transmitter for aeroplanes. (15 marks)
8. With reference to quality control policy in aviation industry:
- (a) state the primary goal and objective; (2 marks)
 - (b) highlight the aims that should be pursued to maintain the highest level of performance; (5 marks)
 - (c) discuss a practical application in an aircraft maintenance organization; (10 marks)
 - (d) state **six** areas of training for personnel. (3 marks)

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