

2507/307

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

Oct./Nov. 2019

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;

Mathematical tables/Non programmable calculator;

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) Explain the operation of the autopilot in “altitude hold mode”. (10 marks)
(b) Describe each of the following flight control laws:
 - (i) Alternate Law 1 (ALT 1);
 - (ii) Alternate Law 2, (ALT 2).(10 marks)
2. Discuss the sequence of events:
 - (a) after selecting the yaw damper to ‘engaged mode’; (14 marks)
 - (b) for an aircraft fitted with Mach trim system with increase in speed. (6 marks)
3. (a) Outline **six** functions of the engine fuel control management system. (6 marks)
(b) Outline **six** inputs and **four** outputs signals of the engine thrust management system. (5 marks)
(c) Explain **five** system requirements for the process of the thrust computation. (5 marks)
(d) List **four** advantages of thrust management system. (4 marks)
4. With the aid of a labelled block diagram, describe how the autopilot controls rolling and pitching movements in modern aircrafts. (20 marks)
5. (a) With the aid of a labelled sketch, show the main source of signals of an electronic engine control for thrust management system. (8 marks)
(b) Explain the reasons why aircrafts are fitted with automatic throttle. (4 marks)
(c) Highlight **four** reasons for installing an aircraft with a yaw damper. (4 marks)
(d) Describe the operation of a Mach trim system in an aircraft. (4 marks)

SECTION B: AIRFIELD SAFETY AND PROCEDURES III

Answer TWO questions from this section.

6. With regards to KCAR's part VII on crash and rescue:
- (a) Highlight the equipment requirements under regulation (66) and sub-regulation (3) 'Life rafts to be provided under this regulation shall be stored so as to facilitate ready use in emergency and be equipped'. (8 marks)
 - (b) Explain the regulation (46) and sub-regulation (1), (2), (3), (5) and (6) detailing the exits requirements. (12 marks)
7. (a) Explain **two** objectives of following the stores procedures in the aviation industry. (4 marks)
- (b) With reference to stores procedures, discuss each of the following:
- (i) SRN's;
 - (ii) JAA form 1. (16 marks)
8. (a) Discuss the principles of quality improvement and management in the aviation industry. (14 marks)
- (b) Explain why quality management is key to the aviation industry. (6 marks)

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