

2507/307

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

June/July 2020

Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL

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

MODULE III

AUTOMATIC PILOT SYSTEMS AND AIRFIELD SAFETY PROCEDURES III

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:

Answer booklet;

Drawing instruments;

Mathematical tables/Non-programmable scientific 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.

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. With reference to modern aircraft basic autostabilizer and with the aid of a labelled block diagram, explain the:
 - (a) purpose and principle of operation of autostabilizer; (10 marks)
 - (b) behaviour of an aircraft which has been displaced in pitch along its flight path. (10 marks)
2. (a) Explain **three** types of flight control inputs. (6 marks)
 - (b) With reference to helicopter stabilization:
 - (i) describe piloting law;
 - (ii) using a labelled block diagram, explain the auto trim based on the piloting law of operation. (14 marks)
3. (a) With the aid a labelled circuit diagram, explain the operation of a hydraulic power unit which can be operated directly by the autopilot. (16 marks)
 - (b) Differentiate between synchronization and stabilization as applied to autopilot control systems. (4 marks)
4. With the aid of a labelled block diagram, explain how thrust is achieved by the flight management computer. (20 marks)
5. Highlight the procedure of carrying out yaw damper BITE operation health test, assuming that the yaw damper is engaged and hydraulics are on. (20 marks)

SECTION B: AIRFIELD SAFETY AND PROCEDURES

Answer *TWO* questions from this section.

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6. (a) Outline **three** areas that should be covered during the initial training of engineering quality management. (3 marks)
- (b) Explain what should happen after the initial training of the quality auditing staff. (5 marks)
- (c) According to KCARs part 145 - 65, explain why quality control is established within approved organizations. (4 marks)
- (d) Explain the working relationship of a licenced aircraft maintenance engineer and quality audit in an aircraft maintenance organization. (8 marks)
7. With reference to crash and rescue, explain the applicable regulations covering the fire fighting equipment. (20 marks)
8. With reference to aircraft airworthiness as stipulated by Kenya Civil aviation regulations. Explain how:
- (a) an owner or operator of an aircraft shall be responsible for maintaining the aircraft in an air worthy condition; (10 marks)
- (b) preventative maintenance or modification on an aircraft should be done by the authorized person. *inspection* (10 marks)

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