

2507/307

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

June/ July 2019

Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL

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

MODULE III

AUTOMATIC PILOT SYSTEMS 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 calculators;

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.

All questions carry equal marks.

Maximum marks for each part of a question are 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 SYSTEMS

Answer **THREE** questions from this section.

1. (a) Describe **three** types of autopilot systems. (10 marks)
- (b) Compare between human piloting and autopiloting. (6 marks)
- (c) Explain hydraulic power supply for the automatic flight control system. (4 marks)
2. (a) Describe the operation of the amplifier and computer for the automatic flight control system. (9 marks)
- (b) Describe the construction and operation of the electrohydraulic servo actuators. (11 marks)
3. (a) Discuss the response of the aircraft heading with respect to flight guidance. (7 marks)
- (b) Discuss flight control laws as applied to fly-by-wire on modern aircrafts. (13 marks)
4. Outline the sequence of automatic landing system under each of the following headings:
 - (a) approach (APP) mode; (7 marks)
 - (b) localiser and glideslope armed; (5 marks)
 - (c) localiser capture; (3 marks)
 - (d) glideslope capture. (5 marks)
5. (a) With the aid of sketches, describe each of the following types of trim tabs:
 - (i) servotab; (7 marks)
 - (ii) auto-balance tab. (7 marks)
- (b) Describe how the automatic pitch trim functions on an aircraft. (6 marks)

SECTION B: AIRFIELD SAFETY AND PROCEDURES III

Answer TWO questions from this section.

6. With reference to KCAR's part VII crash and rescue, explain:
- (a) regulation (55) and sub-regulation (1), (2), (3), (4) and (5), that details the requirements for marking of break-in-points. (10 marks)
 - (b) with the aid of a labeled sketch, regulation (54) and sub-regulation (6) detailing the marking diagram for the break-in-points. (6 marks)
 - (c) regulation (54) and sub-regulation (1), (2) and (3) detailing the crash axe requirements. (4 marks)
7. (a) Highlight the information that must be recorded before and after replacing an aircraft engine. (6 marks)
- (b) Discuss the stores incoming certification process as applied in aviation, stating **two** advantages. (14 marks)
8. (a) Explain KCAR's requirements on quality management system for holders of each of the following:
- (i) AOC;
 - (ii) AMO;
 - (iii) ATO.
- (6 marks)
- (b) Highlight **fourteen** quality management practices with regards to aviation quality systems. (14 marks)

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