

2507/304

**AIRCRAFT COMMUNICATION,
SURVEILLANCE AND
NAVIGATION SYSTEMS**

June/July 2018

Time: 3 hours



**THE KENYA NATIONAL EXAMINATIONS COUNCIL
DIPLOMA IN AERONAUTICAL ENGINEERING
(AVIONICS OPTION)**

MODULE III

AIRCRAFT COMMUNICATION, SURVEILLANCE AND NAVIGATION SYSTEMS

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:

Answer booklet;

Drawing instruments;

Non-programmable scientific calculator.

*This paper consists of **EIGHT** questions in **THREE** sections; **A**, **B** and **C**.*

*Answer **THREE** questions from section **A**, **ONE** question from section **B**, and **ONE** question from section **C**.*

***ALL** questions carry equal marks.*

Maximum marks for each part of a 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: NAVIGATION

Answer **THREE** questions from this section.

1. With reference to automatic direction finder system:
 - (a) Sketch and explain how the problem of ambiguity at 180° is overcome. (6 marks)
 - (b) Draw a typical block diagram and explain the function of each component. (14 marks)
2. With the aid of a labelled block diagram, show the layout and signal flow of an air borne instrument landing system based on signals received from various associated equipments. (20 marks)
3. With the aid of labelled sketches, explain the principle of operation of each of the following types of aerials:
 - (a) Half-wave dipole; (9 marks)
 - (b) Marconi quarter wave; (6 marks)
 - (c) Yagi array. (5 marks)
4. (a) With the aid of sketch, explain the doppler measurement of ground speed using a single beam system. (11 marks)
(b) Explain **three** disadvantages of a single beam system compared to a beam Janus doppler system. (9 marks)

SECTION B: AIR CRAFT COMMUNICATION

Answer **ONE** question from this section.

5. With the aid of a block diagram, explain how passengers can be entertained with film and music simultaneously in a commercial airliner with clarity. (20 marks)
6. (a) With the aid of a labelled diagram, show the installation layout of service interphone in a commercial aircraft. (9 marks)
(b) Explain why the audio accessory is installed in an aircraft intergrated audio system. (11 marks)

SECTION C: SURVEILLANCE

Answer ONE question from this section.

7. (a) With reference to aircraft surveillance equipment, outline **four**:
- (i) functions of the transponder;
 - (ii) requirements of a secondary surveillance radar. (8 marks)
- (b) With aid of labelled block diagram, show the layout and signal flow for a typical transponder. (12 marks)
8. (a) Explain each of the following advisories as applicable to traffic collision avoidance system (TCAS):
- (i) resolution; (4 marks)
 - (ii) traffic. (2 marks)
- (b) Explain **four** TCAS immediate action after a resolution advisory is issued by the system. (8 marks)
- (c) Explain the operation of an emergency locator beacon fitted on an aircraft. (6 marks)

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