

2507/201

**AIRCRAFT INSTRUMENTS AND
MEASUREMENT SYSTEMS**

Oct./Nov. 2018

Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL

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

MODULE II

AIRCRAFT INSTRUMENTS AND MEASUREMENT SYSTEMS

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.*

*Answer **FIVE** questions 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.**

1. (a) Explain each of the following terms as applied to fundamental units of measurements:
(i) derived;
(ii) absolute;
(iii) decimal multiples and submultiples. (6 marks)

(b) Differentiate between each of the following standards of units of measurements:
(i) primary and secondary;
(ii) working and international. (4 marks)

(c) Given that one side of a square metal is 1.001 cm, where the error is 0.001 cm, explain the process of calculating the resultant error of the area of the metal. (10 marks)

2. (a) (i) With the aid of labelled circuits, explain how the hall effect can be used to measure current.
(ii) Outline **one** merit and **three** demerits of using hall effect to measure current. (10 marks)

(b) With the aid of a labelled circuit diagram, describe how self-inductance and equivalent series resistance measurement, using a triangle shaped current, can be performed. (10 marks)

3. (a) With the aid of a labelled sketch, describe the construction and operation of an aneroid barometer. (12 marks)

(b) With reference to pressure instruments, show the difference between each of the following:
(i) plane and corrugated diaphragm;
(ii) capsule and bellow. (6 marks)

(c) Explain **two** reasons why mercury is the commonly used liquid in manometers. (2 marks)

4. With the aid of a labelled sketch, explain the construction and principle of operation of the artificial horizon. (20 marks)

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5. (a) Describe each of the **three** main components of the aircraft flight recorder. (10 marks)
- (b) Given the equipment failure data analysis, explain **five** types of maintenance that enhance reliability. (10 marks)
6. (a) Explain the application of a sextant as an astronomical instrument. (5 marks)
- (b) With the aid of sketches, explain the principle of operation of a refracting telescope. (15 marks)
7. (a) Describe the magnetic compass. (6 marks)
- (b) With the aid of a labelled sketch of a basic altimeter, describe the function of each indicator on the instrument face. (14 marks)
8. (a) Outline **five** functions of the aircraft diagnostic and maintenance systems (AADMMS). (5 marks)
- (b) With respect to the aircraft central maintenance system:
- (i) highlight **six** functions of the engine monitoring unit; (3 marks)
 - (ii) discuss the processing and display of maintenance messages. (12 marks)

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