2507/201
AIRCRAFT INSTRUMENTS AND
MEASUREMENT SYSTEMS
Oct./Nov. 2017
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:

Drawing instruments;
Mathematical tables / Non-programmable scientific calculator.

*This paper consists of **EIGHT** questions.*
*Answer **FIVE** questions in the answer booklet provided.*
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.

1. (a) Outline **four** main advantages of using electrical gyroscope over air driven gyroscope. (4 marks)

(b) Explain the application and principle of operation of each of the following aircraft instruments:

(i) direction indicators;

(ii) artificial horizon.

(12 marks)

(c) Explain the relationship between the rate of procession or angular change to applied force and gyro rotor speed. (4 marks)

2. (a) Highlight the basic procedure for soldering avionic component circuits during repairs. (6 marks)

(b) With the aid of sketches, show **six** common soldering faults and state the cause for each. (12 marks)

(c) State **four** reasons for using flux during soldering electrical circuits. (2 marks)

3. (a) Explain **three** causes of each of the following in gyroscopic instruments:

(i) real wander;

(ii) apparent wander.

(6 marks)

(b) With reference to gyro systems, explain practically how apparent wander is corrected. (7 marks)

(c) With the aid of a labelled sketch, show the construction of a gravity levelling horizontal gyroscope. (7 marks)

4. (a) Outline **four** reasons as to why modern aircrafts are fitted with flight data recorder and state **three** design requirements. (7 marks)

(b) Highlight the recording capabilities of a serviceable cockpit voice recorder according to ICAO regulations. (7 marks)

(c) Highlight **five** design requirements of cockpit voice recorder. (6 marks)

5. Describe the construction design, function and safety aspects of each of the following main assemblies of a telescopic sextant:

(a) telescopic tube; (10 marks)

(b) eye piece assembly; (6 marks)

(c) the bubble unit. (4 marks)

6. (a) Describe **five** main errors associated with aircraft altimeters. (10 marks)

(b) With the aid of a labelled cross-sectional diagram, describe the construction and operation of the instantaneous vertical speed indicator. (10 marks)

7. (a) Explain **six** minimum standards of circumstances for aircraft instruments according to International Civil Aviation Organization (I.C.A.O). (6 marks)

(b) Differentiate between pitot pressure and static pressure. (4 marks)

(c) With the aid of labelled diagrams, show the difference between basic six and basic tee instrument layout. (10 marks)

8. With reference to aircraft wiring circuit diagram, explain each of the following:

(a) safety when measuring isolation valves on high voltage system; (7 marks)

(b) procedure of measuring resistance of single conductors using isolation resistance meter; (3 marks)

(c) the safety, operation setting and testing of the isolation meter. (10 marks)

THIS IS THE LAST PRINTED PAGE.