2507/201
AIRCRAFT INSTRUMENTS AND MEASUREMENT SYSTEMS
June/July 2020
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 table/Non-programmable Scientific calculator.
*Answer **FIVE** of the **EIGHT** questions.*
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.

Turn over

1. (a) Describe the construction and principle of operation of a refracting telescope. (18 marks)

(b) State **four** limits of a periscope design. (2 marks)

2. With the aid of a labelled sketch, discuss the construction and principle of operation of an air speed indicator. (20 marks)

3. (a) Outline **five** serviceability checks on an airspeed indicator and pressure supply system that should be made before flight on modern aircrafts. (5 marks)

(b) Explain **four** signal transmission techniques from a sensor to a display on aircraft instrument. (11 marks)

(c) Discuss **four** reasons why acceleration errors are minimal in the electric artificial horizon. (4 marks)

4. (a) Describe the principle, construction and operation of a laser gyro. (15 marks)

(b) Explain **five** advantages of inertia reference system. (5 marks)

5. (a) Differentiate between secondary and working standards of units. (9 marks)

(b) Describe the types of direct methods of measurements. (5 marks)

(c) With the aid of a labelled block diagram, show the organization of the central maintenance computer menu for fault diagnostic purpose on modern aircraft. (6 marks)

6. (a) With the aid of a labelled block diagram, show the layout of a typical cathode-ray oscilloscope. (14 marks)

(b) Explain instrument errors as applied in measurements stating **three** ways they can be avoided. (6 marks)

7. With the aid of a labelled sketch, explain the construction and operation of oxygen pressure demand regulator. (20 marks)

8. (a) Differentiate between each of the following terms with reference to equipment design and development:

(i) error and fault;
(ii) probable and improbable failure condition;
(iii) primary and secondary failures.

(6 marks)

(b) With the aid of a block diagram, show the classification of failure. (8 marks)

(c) Explain each of the following testing techniques for assessing equipment reliability potential:

(i) reliability; (2 marks)
(ii) integrity. (4 marks)

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