2507/201
AIRCRAFT INSTRUMENTS AND MEASUREMENT SYSTEMS
Oct./Nov. 2021
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 scientific calculator.
*This paper consists of **EIGHT** questions. Answer **FIVE** questions.*
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.

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1. With reference to equipment reliability, describe:

   (a) **three** types of equipment failure using a labelled graph of a bath tub curve; (16 marks)

   (b) partial failure. (4 marks)

2. (a) Discuss the application of a sextant as an astronomical instrument. (6 marks)

   (b) Describe the principle of operation of an aircraft periscope. (14 marks)

3. (a) Discuss the effects of compressibility on the operation of aircraft airspeed indicators. (6 marks)

   (b) With the aid of a labelled cross sectional diagram, describe the construction and operation of the instantaneous vertical speed indicator. (14 marks)

4. (a) With reference to direct reading compass:

      (i) highlight **six** functional checks carried out during maintenance; (3 marks)

      (ii) sketch and label the compass; (4 marks)

      (iii) explain the construction. (5 marks)

   (b) Describe the components of a gyro magnetic compass. (8 marks)

5. (a) With the aid of a labelled schematic diagram, explain the principle of operation of an inertia navigation accelerometer. (8 marks)

   (b) Sketch and label a simplified schematic diagram of a single axis inertial navigation system. (4 marks)

   (c) Differentiate between each of the following gyros:

      (i) rate and tied;
      (ii) earth tied and free. (8 marks)

6. (a) Explain the performance characteristics of an ideal central maintenance computer fitted on modern aircrafts. (9 marks)

   (b) With the aid of a labelled diagram,show a typical layout of a central maintenance interface information indication system. (11 marks)

7. With the aid of labelled circuit diagrams:

(a) state the application of an electrodynamic voltmeter; (7 marks)

(b) describe a series type ohm meter. (13 marks)

8. (a) Explain **three** types of aircraft oxygen delivery systems. (6 marks)

(b) Describe a gaseous oxygen system. (8 marks)

(c) With the aid of a labelled cross-sectional sketch, show the construction of an oxygen generator used on aircraft system. (6 marks)

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