

2507/201
AIRCRAFT INSTRUMENTS AND
MEASUREMENT SYSTEMS
June/July 2023
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 of the EIGHT questions in the answer booklet.

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 **four** primary magnetic properties of a material that can be determined from the hysteresis loop. (8 marks)
- (b) With the aid of a labelled schematic diagram, describe the construction and operation of a simple Shunt type Ohmmeter. (12 marks)
2. (a) Outline the circumstances under which an aircraft with inoperative instrument may be operated. (7 marks)
- (b) Outline the minimum flight and navigational instruments an operator shall not fly an aeroplane under IFR. (13 marks)
3. (a) With reference to aircraft flight instruments bench check regulations, outline the requirements for each of the following:
 - (i) ratings; (2 marks)
 - (ii) servicing. (4 marks)
- (b) With the aid of a labelled sketch, describe the construction and principle of operation of an inertial navigation system. (14 marks)
4. (a) With the aid of a labelled sketch, explain the use of a spherical concave mirror in the design of Schmidt Cassegrain telescope. (10 marks)
- (b) Describe the application of astronomical instruments. (10 marks)
5. With reference to central maintenance computing and fault diagnostic tools, describe each of the following:
 - (a) fault isolation manual; (4 marks)
 - (b) BITE; (8 marks)
 - (c) faults isolation. (8 marks)
6. (a) With the aid of a labelled block diagram, explain the layout of a ground proximity warning system. (9 marks)
- (b) Outline **ten** reasons for carrying out compass swing. (5 marks)
- (c) Explain **three** errors due to calibration of a sensitive altimeter. (6 marks)

7. (a) With the aid of a labelled block diagram, show a typical digital flight data recording system (DFDR). (10 marks)
- (b) Highlight **four** ways of operating a typical flight data recorder. (4 marks)
- (c) Outline **six** reasons for the calibration of digital flight data recorders. (6 marks)
8. With reference to equipment reliability, discuss **five** major causes of equipment failure. (20 marks)

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