

2507/201
AIRCRAFT INSTRUMENTS AND
MEASUREMENT SYSTEMS
June/July 2022
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) Discuss 'density error' with reference to airspeed indicators. (5 marks)
- (b) With the aid of labelled sketches, show the operation of a vertical speed indicators at each of the following conditions:
- (i) zero static pressure;
 - (ii) increasing static pressure;
 - (iii) reducing static pressure.
- (9 marks)
- (c) With reference to air data systems, highlight **six** characteristics for each of the following pressures:
- (i) static;
 - (ii) pitot.
- (6 marks)
2. (a) With reference to gyroscopic instruments , explain **two** sources of power supply. (7 marks)
- (b) With the aid of a labelled sketch, describe the construction and principle of operation of the artificial horizon. (13 marks)
3. (a) Explain **five** types of maintenance undertaken after analysing the equipment failure data to improve an aircraft system reliability. (10 marks)
- (b) Differentiate between error and fault with reference to equipment design and development. (2 marks)
- (c) With the aid of a block diagram, show how failure can be classified. (8 marks)
4. (a) Highlight **four** advantages of refracting telescope. (4 marks)
- (b) With reference to astronomical periscopes, describe each of the following:
- (i) construction; (5 marks)
 - (ii) principle of operations; (3 marks)
 - (iii) four errors. (8 marks)

5. (a) Explain **seven** reasons why it is advantageous to use air data system compared with mechanical instruments in modern aircrafts. (14 marks)
- (b) Explain **six** functions provided for by the central maintenance computer function (CMCF) in an aircraft central management system. (6 marks)
6. With the aid of labelled circuit diagrams, describe the construction and operation of:
- (a) electrodynamic ammeter; (10 marks)
- (b) fluxmeter. (10 marks)
7. With reference to oxygen storage cylinders, describe each of the following:
- (a) construction; (5 marks)
- (b) testing; (5 marks)
- (c) life limits specifications; (5 marks)
- (d) safety. (5 marks)
8. With reference to measurement instruments:
- (a) Differentiate between the terms 'measurement' and 'standard'. (4 marks)
- (b) Discuss each of the following:
- (i) mechanical;
- (ii) absolute;
- (iii) secondary. (12 marks)
- (c) Explain a working standard. (4 marks)

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