

2507/201
AIRCRAFT INSTRUMENTS AND
MEASUREMENT SYSTEMS
Oct./Nov. 2023
Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL
DIPLOMA IN AERONAUTICAL ENGINEERING
(AIRFRAME AND ENGINES 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** of the **EIGHT** 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.

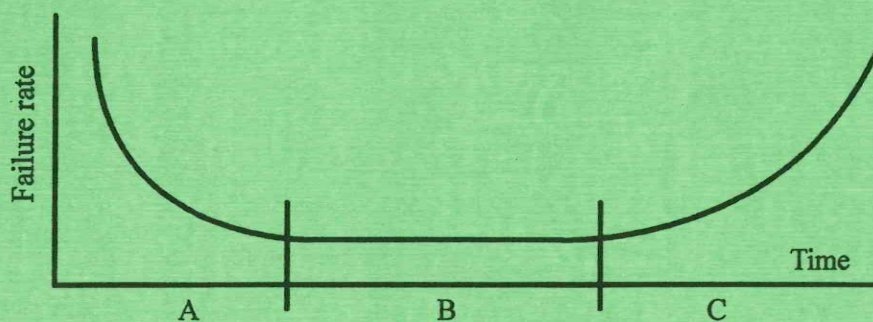
**Candidates should check the question paper to ascertain that
all the pages are printed as indicated and that no questions are missing.**

1. With reference to aircraft gaseous oxygen system:
 - (a) Show and label a typical component layout. (8 marks)
 - (b) Highlight **four** safety consideration for each of the following during replenishing:
 - (i) rate of charging;
 - (ii) thermal compensations;
 - (iii) bacterial contamination. (12 marks)

2. (a) With reference to air data system, highlight **six** characteristics for static pressures. (6 marks)
- (b) Discuss 'density error' with reference to airspeed indicators. (5 marks)
- (c) With aid of labelled sketches, show the operation of a vertical speed indicator when at each of the following conditions:
 - (i) zero static pressure;
 - (ii) increasing static pressure;
 - (iii) reducing static pressure. (9 marks)

3. (a) Highlight **six** disadvantages of refracting telescopes. (6 marks)
- (b) With aid of labelled sketches, describe the operating principle of refracting telescopes. (14 marks)

4. (a) Explain **five** types of maintenance servicing decisions that can be undertaken after analyzing an equipment failure data to improve an aircraft system reliability. (10 marks)
- (b) Graph 1 shows the bath-tub curve. Explain how each of the points A, B and C are used to determine equipment reliability. (10 marks)



Graph 1

5. (a) Define a measurement system as applied in instrumentation. (2 marks)
- (b) Describe an indirect comparison method in measurement. (4 marks)
- (c) Explain international standard of units. (4 marks)
- (d) With aid of labelled block diagram, show a typical layout of the components of a measurement system. (10 marks)
6. (a) Outline **five** advantages of inertia reference systems. (5 marks)
- (b) Describe the principle, construction and operation of a laser gyro. (15 marks)
7. With the aid of labelled information flow diagrams, explain the construction of ARINC 629 type of central maintenance airborne diagnostic tool and instrument test equipment. (20 marks)
8. (a) With reference to flight data recorder:
- (i) Highlight the conditions under which an aircraft can be cleared to fly with a defective FDR;
- (ii) Allowable period of recording according to ICAO. (8 marks)
- (b) Describe the recording process of CVR. (6 marks)
- (c) Explain the function, design requirements and components of a CVR system. (6 marks)

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