

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.*

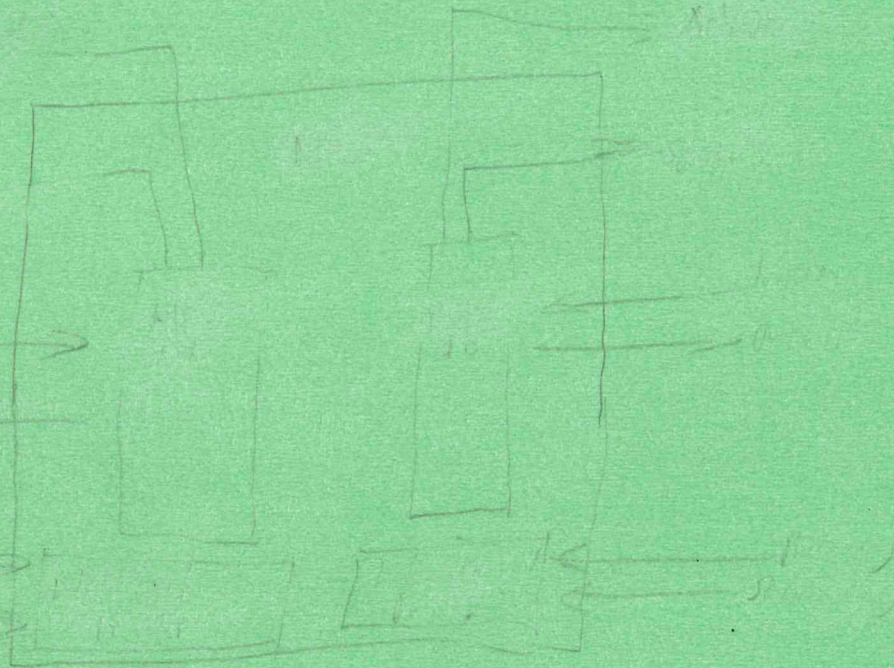
**This paper consists of 3 printed pages.**

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

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 aircraft. (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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