

2507/201

**AIRCRAFT INSTRUMENTS AND  
MEASUREMENT SYSTEMS**

**June/July 2017**

**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:*

*Mathematical tables / Scientific non-programmable calculator;*

*Drawing instruments;*

*Answer booklet.*

*This paper consists of EIGHT questions.*

*Answer FIVE of the following EIGHT questions.*

*ALL questions carry equal marks.*

*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) Explain **six** minimum requirements for aircraft instruments as defined by the International Civil Aviation Organization (ICAO). (12 marks)
- (b) Outline the standard atmosphere values assumed by ICAO. (8 marks)
- 2. (a) (i) With the aid of a labelled sketch, explain the operation of a combined pilot static system. (9 marks)
- (ii) State **one** advantage of the system. (9 marks)
- (b) With regards to aircraft pitot static system, explain the:
  - (i) factors to be considered at design level to minimize pressure errors;
  - (ii) care of pressure heads. (11 marks)
- 3. With the aid of a labelled sketch, describe the construction and principle of operation of the rate of turn gyroscope. (20 marks)
- 4. With the aid of a block diagram, explain the design of a typical operational BITE program used in aircraft maintenance system. (20 marks)
- 5. (a) Describe **two** common principal features of direct reading compasses. (8 marks)
- (b) Outline **three** requirements of a practical direct reading magnetic compass. (3 marks)
- (c) With the aid of a labelled sketch, describe the construction of the flux valve used in remote compasses. (9 marks)
- 6. With the aid of sketches, describe each of the following with respect to astronomical instruments:
  - (a) telescope; (8 marks)
  - (b) the difference between the Huygenian and Ramsden eye piece. (12 marks)
- 7. (a) Highlight **three** systematic troubleshooting approaches which would result in problem solving. (3 marks)
- (b) Outline the preparation to be carried out prior to performing insulation tests in aircraft systems. (7 marks)
- (c) Draw a logical fault finding tree to solve problems associated with aircraft systems. (10 marks)



8. (a) With the aid of a labelled sketch, show the layout of a gaseous oxygen system components. (5 marks)
- (b) Explain each of the following with respect to replenishing aircraft oxygen systems:
- (i) rate of charging;
  - (ii) thermal compensator;
  - (iii) bacteria contamination;
  - (iv) fire and explosion.
- (15 marks)

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