



# **EAST AFRICAN SCHOOL OF AVIATION EXAMINATION**

## **END TERM II EXAMS**

**DIPLOMA IN AERONAUTICAL ENGINEERING AVIONICS**

**CODE: AVI 221 AIRCRAFT INSTRUMENTS AND MEASUREMENT SYSTEMS.**

**STREAM:MODULE 2 Avionics**

**Duration:3.00 HRS**

**DAY/DATE:**

**TIME:**

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### **INSTRUCTION TO CANDIDATES**

*You should have the following for this examination:*

*Answer booklet;*

*Mathematical tables/ Electronic calculator.*

*Answer any FIVE questions*

*All questions carry equal marks.*

*Maximum marks for each part of a question are as shown*

**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)(i) State four(4) precautions which are supposed to be observed when using a ammeter as a source of a measuring technique. 4 marks

(ii) In DC circuits ,name three instruments used for measuring. 3 marks

(iii) Explain damping as it is used in DC measuring instruments and give two(2) types of damping. 3 marks

{b}(i) Which meter is used to measure insulation resistance and high resistance values. 2 marks

(ii) Describe the units of frequencies and state how frequencies are measured. 2 marks

(iii) Explain where a moving iron vane meter can be used and state the principle it utilizes. 6 marks

2(a)(i) Name the three(3) Q –codes in an altimeter and explain the meaning of each Q –code and how it is achieved. 6 marks

(ii) Explain how pitot and static pressures are collected into an aircraft to operate the instruments. 4 marks

(b)(i) With a well labeled diagram of a pitot- static system, show the four instruments which are used in the air data system and state which pressures they are connected to 6marks

(ii) Explain the purposes of both pitot tube and static probe and state what prevents building up of ice in the system. 4 marks

3(a)(i) State the laws governing the operation of aircraft instruments and explain the altitudes where these laws are applicable. 6 marks

(ii) What class of a pilot will be allowed to use the said laws if the weather conditions are not favorable and which law is going to be used. 2 marks

(iii) When are the aircraft instruments supposed to be calibrated. 2 marks

(b)(i) Explain how pitot tube and static probes(vents) are supposed to be free from FOD(foreign object damage) in order to get the correct reading from the instruments. 4 marks

(ii) Describe an altitude, height, and an elevation from the barometric setting of an altimeter. 6 marks.

4(a)(i) Describe what a gyroscope is and explain rigidity and precession as applied to gyroscopes. 10 marks.

(ii) State the three degrees of freedom of a gyroscope and name all the properties of a gyroscope. 10 marks

5(a) Name all the factors which are dependant of rigidity and factors that are dependants of precession as properties of a gyroscope. 6 marks

- (b)(i) Explain how gimbals and the frame of a gyroscope are connected to one another. 2 marks
- (ii) Define real drift and apparent drift and explain how transport wander can be controlled. 6 marks
- (c) In displacement gyroscope limitations explain how gimbal lock and gimbal errors are achieved and state the behavior of the gyroscope at that time. 6 marks
- 6(a) Describe three(3) types of oxygen and their systems. 6 marks
- (b) In(a)(i) above, explain; continuous flow, diluter demand and chemical systems. 6 marks
- (c) State three(3) safety precautions to be observed when working with oxygen in an aircraft. 4 marks
- (d) Describe the colours painted on the oxygen charging bottles which are used for charging oxygen into the aircraft. 4 marks
- 7(a)(i) Describe two principal methods of driving the rotors of gyroscope flight instruments. 4 marks
- (ii) Explain the operation of a pneumatic type of rotor method used and state the value in inches of mercury that the rotor is supposed to work up to comfortably. 4 marks
- (iii) What are the purposes of; vacuum indicator, relief valve and air filter in the pneumatic system. 2 marks.
- (b)(i) Which type of attitude of axis does a gyroscope horizon indicate. 4 marks
- (ii) An electric gyroscope horizon requires what type of power supply. 2marks
- (iii) Explain one of the essential requirements of any gyroscope to have and state what is ensured by this essential requirement. 6 marks
- 8(a) Explain three(3) assemblies which ensures that the AC power supply is fed to the motor stator of a gyroscope. 6 marks
- (b) Describe the instrument which uses DC motor to power its gyroscope and explain the reason as to why. 4 marks
- (c) State two(2) types different types of angles which the gimbal errors depend upon. 6 marks
- (d) Explain the purpose of gimbal ring balancing. 4 marks