



**EAST AFRICAN SCHOOL OF AVIATION
EXAMINATION**

END TERM I I EXAMS

DIPLOMA IN AERONAUTICAL ENGINEERING AVIONICS

CODE: AVI 225 MEASUREMENT TECHNOLOGY

STREAM: MODULE2 Avionics

Duration:3.00 HRS

DAY/DATE:

TIME:

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.µ

- 1(a) Explain three(3) major causes of vibration in any machine. 6 marks
- (b) State what comprises the bulk of vibrations and shock parameters in vibrating bodies. 6 marks
- (c) Name three (3) quantities which are required to be measured for measurement of vibrations. 3 marks
- (d) Define the most important transducer for measurement of vibration and give out four reasons why measurement of acceleration is preferred. 6 marks
- 2 (a) Describe the reason why measurement of temperature is very common in the field of instrumentation. 4 marks
- (b)(i) State the principle of measurement used by thermocouples to determine temperatures of hot baths or molten industrial baths. 12 marks
- (ii) How are several thermocouples made from the same materials connected with all measuring junctions in order to have increased sensitivity. 2 marks
- (c) Name three(3) drawbacks of radiation pyrometers as a temperature measuring device. 6 marks
- (d) Describe two(2) classes or group of temperature measuring devices and in each group, name two devices used to measure temperature. 6 marks
- 3 (a)(i) Explain the reason as to why measurement of liquid level is widely carried out. 2 marks
- (ii) Write down all the conditions which will lead to a selection of a type of device to measure liquid level. 2 marks
- (b) Explain two types of liquid level measurement and out of these ,state two methods of each type. 4 marks
- (c) Describe six methods used to measure liquid level. 6 marks
- (d) State the principle operation of a resistive method of measurement and name four advantages of this method. 6 marks
- 4(a) In SI system, define pressure and state how pressure can be expressed at very low magnitudes, 4 marks
- (b)(i) List down the classes of mechanical devices which are used to measure pressure. 2 marks
- (ii) Give an example of one device of each type or class in (b)(i) above. 2 marks
- (c) Explain four categories of instruments used as pressure measuring devices. 8 marks
- (d) Describe the principle used by an electro-mechanical device to measure pressure. 4 marks

- 5(a) With a well labeled diagram, explain the operation of measurement of angular velocity by an AC generator tachometer. 16 marks
- (b) Describe the purpose of both the filter and the rectifier in the drawing at (a) above. 4 marks
- 6(a) Define measurement and explain what is a measuring instrument. 4 marks
- (b)(i) State two basic performance characteristics of measurement. 2 marks
- (ii) Explain two static characteristic and two dynamic characteristics terms which are frequently used during measurement. 2 marks
- (c)(i) What is meant by loading effect?. 2 marks
- (ii) Name all the stages that a measurement system consist of. 2 marks
- (d)(i) Define resolution in terms of measurement. 2 marks
- (ii) Explain what is meant by reading correction and how is it related to absolute error. 2 marks
- (iii) What is meant by an absolute error of measurement?. 2 marks
- (iv) Define relative error and show how it can be expressed. 2 marks
- 7(a) Give two drawbacks of why stroboscopic method for measurement of speed is not good. 4 marks
- (b) Where can stroboscopic method of measurement of speed be used? 4 marks
- (c)(i) What provides periodic flashes of light of very short duration when using stroboscope as a source of speed measuring device. 2 marks
- (ii) Describe how stroboscopes are generally calibrated. 2 marks
- (d)With a clear diagram explain how a photo- electric pickup tachometer can be used as a measurement device. 8 marks
- 8(a) Explain the principle of operation of a bimetallic thermometers. 6 marks
- (b) State the reason as to why when bimetallic thermometer strip is heated it expands in length. 6 marks
- (c) Which direction will the strip expand to in the (b) above and why. 4 marks
- (d) Describe how the sensitivity of a bimetallic strip can be increased. 4 marks