



MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY

P.O. Box 972-60200 – Meru-Kenya.

Tel: +254(0) 799 529 958, +254(0) 799 529 959, +254 (0)712 524 293

Website: www.must.ac.ke Email: info@mucst.ac.ke

UNIVERSITY EXAMINATIONS 2024/2025

THIRD YEAR FIRST SEMESTER EXAMINATION FOR DEGREE OF BACHELOR OF TECHNOLOGY IN MECHANICAL ENGINEERING

EMT 3303: METROLOGY

DATE: JANUARY 2025

TIME: 3 HOURS

INSTRUCTIONS: Answer Question ONE and any other TWO questions.

QUESTION ONE (30 MARKS)

- a) Define the following terms as applied in science of measurements:
 - i. Standard (1 mark)
 - ii. Precision (1 mark)
 - iii. Correction (1 mark)
 - iv. Calibration (1 mark)
 - v. Tolerance (1 mark)
- b) Explain the following types of measurements
 - i. Interval measurement (2 marks)
 - ii. Comparison measurement (2 marks)
- c) Discuss FOUR ways of improving accuracy in measurements. (8 marks)
- d) Illustrate the working principle of a Sine bar as a primary instrument for precise angular measurements. (5 marks)



- e) Inspection is an indispensable tool of modern manufacturing process. Discuss FOUR objectives of inspection. (8 marks)

QUESTION TWO (15 MARKS)

- a) Explain the term interchangeability in metrology. (2 marks)
- b) In order to facilitate interchangeability of manufacture, components are made in accordance with permissive tolerance limits provided in the design. Discuss the FOUR categories of classifying tolerances in metrology. (8 marks)
- c) Outline FIVE key elements involved in metrology as a science of measurement both in theory and practice. (5 Marks)

QUESTION THREE (15 MARKS)

- a) Differentiate line standard from end standard (2 marks)
- b) Illustrate the hierarchical classification of standards in metrology. (5Marks)
- c) Explain FOUR ways in which standard of measurement influence industrial development of a country. (8Marks)

QUESTION FOUR (15 MARKS)

- a) Define a comparator (1 mark)
- b) Give FOUR classifications of comparators according to their principles of obtaining magnification. (4 marks)
- c) Discuss FIVE factors that influence surface finish of a manufactured component. (10marks)

QUESTION FIVE (15 MARKS)

- a) Explain the FOUR principles that govern the applications of optics in metrology.(8 Marks)
- b) Outline FIVE essential features that an optical instrument should have. (5 Marks)
- c) Give TWO application of autocollimators. (2 marks)

