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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)



MUST is ISO 9001:2015 and



ISO/IEC 27001:2013 CERTIFIED

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)

