



MURANG'A UNIVERSITY OF TECHNOLOGY

SCHOOL OF ENGINEERING TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS
ENGINEERING

UNIVERSITY ORDINARY EXAMINATION

2023/2024 ACADEMIC YEAR

..... YEAR **SECOND** SEMESTER EXAMINATION FOR, BACHELOR OF
SCIENCE IN

EMT 307– METROLOGY

DURATION: 2 HOURS

Instructions to candidates:

1. Answer question One and Any Other Two questions.
2. Mobile phones are not allowed in the examination room.
3. You are not allowed to write on this examination question paper.

SECTION A: ANSWER ALL QUESTIONS IN THIS SECTION

QUESTION ONE (30 MARKS)

1. Define metrology (2marks)
2. Explain atleast three significance of metrology (3marks)
3. Differentiate between accuracy and precision (4marks)
4. Explain how a micrometer conforms to Abbe's law (3marks)
5. Explain the two greatest advantages of an electronic digital caliper (2marks)
6. Discuss any three applications of angle dekker in metrology (
7. What are the three major advantages of electronic comparators that have made them the first choice in inspection metrology (3marks)
8. Define unilateral and bilateral to clearances and give examples for each case (4marks)
9. Discuss any three major features of the stylus system of measurement (3marks)
10. What are the primary reasons for surface irregularities (3marks)

SECTION B – ANSWER ANY TWO QUESTIONS IN THIS SECTION

QUESTION TWO (20 MARKS)

1. Explain any three elements of a spur gear that require inspection and give atleast one instrument that is used for measuring each of those elements (4marks)
2. Distinguish between progressive pitch error and periodic pitch error (4marks)
3. Discuss atleast three guidelines to be followed for proper use of vernier caliper (3marks)
4. Explain using neat sketches the phenomenon involved in “wringing” of slip gauges (5marks)
5. Discuss at least two needs for inspection (2marks)

QUESTION THREE (20 MARKS)

1. Describe with a sketch the principle behind the working of an autocollimator (8marks)
2. Discuss any two important uses of a digital autocollimator in the industry (2marks)
3. List three disadvantages of materials standards (3marks)
4. Distinguish between line and end standards (2marks)
5. Discuss five important applications of a tool maker's microscope (5marks)

QUESTION FOUR (20 MARKS)

1. Define fit and with the help of neat sketches explain the different types of fits (8marks)
2. Differentiate between hole basis and shaft basis systems (4marks)
3. A clearance fit has to be provided for a shaft and bearing assembly having a diameter of 40mm. Tolerances of hole and shaft are 0.006 and 0.004mm, respectively. The tolerances are disposed

unilaterally. If an allowance of 0.002mm is provided, find the limits of size for hole and shaft when,

- a) Hole basis system (10marks)
- b) Shaft basis system are used (6marks)
- 4. Explain four advantages of linear variable differentia transformer (LVDT) compared to other comparators (4marks)