UNIVERSITY COLLEGE TATI

UNIVERSITY COLLEGE TATI (UC TATI)

FINAL EXAMINATION QUESTION BOOKLET	
COURSE CODE	: BME 2043
COURSE	: ENGINEERING METROLOGY
SEMESTER/SESSION	: 2-2023/2024
DURATION	: 3 HOURS

Instructions:

1. This booklet contains 5 questions. Answer **ALL** questions.
2. All answers should be written in answer booklet.
3. Write legibly and draw sketches wherever required.
4. If in doubt, raise your hands and ask the invigilator.

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO

THIS BOOKLET CONTAINS 4 PRINTED PAGES INCLUDING COVER PAGE

QUESTION 1

The International System of Units (SI) is part of standard in which globally-agreed basis for expressing measurements at all levels of precision, and in all areas of science, technology, and human.

a) **Give** the definition of "Standard". (3 marks)

b) **Explain** the two (2) main reasons for having instruments calibrated. (4 marks)

c) **Describe** the characteristics of "End Standards". (4 marks)

d) **Classify** three (3) types Subdivision of Standards. (9 marks)

QUESTION 2

Gauges are instrument that measures and gives whether the inspected parts are made within the specified limits, shapes or forms and meet functional requirements.

a) **Clarify** two (2) types of gauges. (2 marks)

b) With aids of sketch, **identify** two (2) types of gauge and its functions. (4 marks)

c) **Prepare** the guidelines for the use of Testing Gauge. (4 marks)

d) **Differentiate** the function of limit gauge and standard gauge. (10 marks)

QUESTION 3

Tolerance optimization during design has a positive impact on the yields coming out of manufacturing and better yields directly affect product cost and quality.

a) **Describe** definition of tolerance. (2 marks)

b) **Discover** classification of tolerance between Unilateral and Bilateral. (4 marks)

c) **Illustrate** about clearance fit and give example. (6 marks)

d) **Solve** using basic hole system and basic shaft system. Given hole minimum diameter 5.250 and the maximum of shaft are 5.500. The allowance is 0.002. The tolerance for hole is 0.003 and shaft is 0.002. (8 marks)

QUESTION 4

Geometric Dimensioning and Tolerancing (GDT) is a precise language of engineering symbols that clearly communicate the design intent of the part.

a) **Explain** three (3) types of tolerance in GDT. (3 marks)

b) **Interpret** the term: "Flatness" and "Straightness" used in GDT. (4 marks)

c) With aids of sketch, **show** tolerance for "Perpendicularity" use in GDT. (7 marks)

d) **Classify** three (3) types of tolerance methods presented. (6 marks)

QUESTION 5

Nanotechnology is useful for investigating the surfaces and characteristics of different materials down to nanometer detail. Accurate surface roughness measurement is not only a highly powerful technique for understanding the basic physics of materials, but also very useful in examining device structures and their failure mechanisms.

a) **Indicate** two (2) factors effect of Surface Roughness. (4 marks)

b) There are basically two approaches for the measurement of surface finish, called "comparison" and "direct measurement". **Interpret** these approaches. (6 marks)

c) **Discover** applications of Nanotechnology. (5 marks)

d) **Identify** what is X Ray Diffraction System (XRD). (5 marks)

----------End of question----------

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Criteria	Marks
All questions answered will be marked according to the answer schema	/ 100