



UNIVERSITY COLLEGE TATI (UC TATI)

FINAL EXAMINATION QUESTION BOOKLET

COURSE CODE	: DGE 1103
COURSE	: MATERIALS SCIENCE
SEMESTER/SESSION	: 1-2023/2024
DURATION	: 3 HOURS

Instructions:

1. This booklet contains 5 questions. Answer **ALL** questions.
2. All answers should be written in the 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 THE COVER PAGE

QUESTION 1

- a. Identify the four main types of materials. List down their properties and examples for each of them. (8 Marks)
- b. Explain the difference between crystalline and amorphous materials. (6 Marks)

QUESTION 2

- a. State the NDT method is commonly used to detect internal flaws in ferrous metal components. (2 Marks)
- b. State the NDT method is commonly used to inspect non-ferrous metal components for surface defects. (2 Marks)
- c. Discuss the advantages of using copper in electrical wiring. (4 Marks)
- d. Identify the differences between metals and non-metals. (10 Marks)
- e. Compare and contrast the properties and applications of two ferrous metals, namely stainless steel and cast iron, considering their composition, microstructure, mechanical properties, and industrial uses. (12 Marks)

QUESTION 3

- a. Identify the similarities and differences between natural and synthetic polymers and provide examples for each category. (10 Marks)
- b. Explain the main difference between thermosetting and thermoplastic materials. (4 Marks)
- c. Provide two (2) examples of thermosetting and thermoplastic materials and their uses. (6 Marks)
- d. Discuss the three main categories of ceramics based on their composition and provide examples for each category. (9 Marks)

QUESTION 4

- a. Define and differentiate between two important mechanical properties of materials: tensile strength and hardness. (4 Marks)
- b. Compare and contrast two types of materials (metals and polymers) based on their mechanical properties (10 Marks)

QUESTION 5

- a. Define Ohm's Law in your own words. (2 Marks)
- b. List down the three variables involved in Ohm's Law. (3 Marks)
- c. Explain the practical applications of Ohm's Law in everyday life or various electrical devices. (4 Marks)
- d. A cylinder rod made of a material with resistivity 3×10^{-7} ohm-meter has a length of 1 meter and a resistance of 5 ohms. Determine the radius of the rod. (4 Marks)

*****END OF QUESTIONS*****