The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Mechanical Engineering

0052

Study Programme	:	Bachelor of Science Honours in Engineering
Name of the Examination	:	Final Examination
Course Code and Title	:	**DMX3203 Introduction to Engineering Materials**
Academic Year	:	2024/25
Date	:	10th March 2026
Time	:	13:30 hours -16:30 hours
Duration	:	**3 hours**

General instructions

1. Read all the instructions carefully before answering the questions.
2. This question paper consists of **Five (05)** questions and answers all questions.
3. The answer to each question should commence from a new page.
4. This is a Closed Book Test (**CBT**).
5. Answers should be in clear handwriting.
6. Do not use Red colour pen.
7. Write the name of the question paper with the course code on the first page of the answer book.
8. Write your index number (not the registration number) on every page of your answer book.
9. Write at the bottom of the first page of your answer book clearly the question numbers you answered.

01	i	Why are the thermal properties of materials important in engineering?	*03 marks*
	ii	Define Thermal Shock Resistance and explain why ceramics usually have low Thermal Shock Resistance values.	*05 marks*
	iii	a) Describe the energy-band model.	*02 marks*
		b) Explain how band structures differ in conductors, insulators, and semiconductors.	*06 marks*
	iv	What are the advantages and applications of high-temperature superconductors?	*04 marks*
02	i	Explain the fundamental concepts of magnetism in materials, including magnetic field strength, magnetic flux density, and permeability.	*06 marks*
	ii	a) Compare diamagnetism, paramagnetism, and ferromagnetism in materials.	*06 marks*
		b) Discuss the behavior of different forms of magnetisms mentioned in a) under external magnetic fields and their applications.	*05 marks*
	iii	What information does the hysteresis loop provide about magnetic materials?	*03 marks*
03	i	Explain the principles of metallic corrosion with electrochemical reactions.	*04 marks*
	ii	a) What are the different types of corrosion mechanisms in metallic materials?	*03 marks*
		b) Briefly explain the two corrosion mechanisms.	*04 marks*
	iii	Explain hydrogen embrittlement and its effects on metals.	*04 marks*
	iv	Discuss the various methods available for corrosion control in engineering applications.	*05 marks*
04	i	Explain the significance of the nanoscale used in Engineering materials.	*06 marks*
	ii	Why do materials exhibit different properties at the nanoscale compared to their macro scale?	*04 marks*
	iii	Explain the two main approaches for manufacturing nanomaterials.	*05 marks*
	iv	Discuss the equipment used for the characterization and processing of nanomaterials.	*05 marks*
05	i	Describe the structure and different configurations of carbon nanotubes.	*06 marks*
	ii	a) Discuss the importance of the mechanical and electrical properties of carbon nanotubes (CNT).	*05 marks*
		b) Explain how these properties make CNTs valuable for various applications.	*05 marks*
	iii	What are the key applications of nano materials in biomedical engineering?	*04 marks*

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