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

00079

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	:	2023/24
Date	:	17th March 2025
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	What are the different types of metal designation methods?	*04 marks*
	ii	State the types of plain carbon steels with their compositions and applications.	*04 marks*
	iii	a) What other alloy elements are available in cast iron except carbon?	*02 marks*
		b) "Cast iron is the most popular material used for sand casting processes." Justify this statement with clear evidence.	*04 marks*
	iv	a) Identify the compounds available in high-performance ceramics.	*02 marks*
		b) What are the advantages and limitations of high-performance ceramics?	*04 marks*
02	i	Differentiate between corrosion and oxidation.	*04 marks*
	ii	a) What are the different types of corrosion?	*02 marks*
		b) Briefly explain two of the corrosion types mentioned above.	*06 marks*
	iii	Explain different methods used to protect steel against corrosion.	*04 marks*
	iv	Discuss the effect of chromium content on the rate of corrosion in steel.	*04 marks*
03	i	What is the thermal shock resistance of a material?	*04 marks*
	ii	a) How is thermal stress generated in engineering components?	*03 marks*
		b) Discuss how they affect the material in service.	*04 marks*
	iii	Why are metals typically better thermal conductors than ceramic materials?	*04 marks*
	iv	A bimetallic strip is constructed from strips of two different metals that are bonded along their lengths. Explain how such a device could be used in thermostat switches to control temperature.	*05 marks*
04	i	Distinguish between a conductor, a semiconductor and an insulator on the basis of their energy band structure.	*09 marks*
	ii	a) Define the term dielectric.	*03 marks*
		b) Explain the common properties and uses of dielectrics.	*05 marks*
	iii	What is a superconductivity?	*03 marks*
05	i	a) Distinguish between the characteristics of dia, para and ferro, magnetism.	*06 marks*
		b) Give an example of each type of material.	*03 marks*
	ii	How can a soft material be converted into a hard magnetic material?	*04 marks*
	iii	State the basic characterization of nanomaterials.	*03 marks*
	iv	Briefly explain two main approaches for the manufacture of nanomaterials.	*04 marks*

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