Roll No. | | | | | | | | | | |

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. /B.Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, APR / MAY 2025

MATERIALS SCIENCE AND ENGINEERING
Semester III
CY23C02 & Polymers, Bio-Materials and Ceramics
(Regulation 2023)

Time: 3 hrs | Max. Marks: 100

CO1	Explain the basics concepts of general polymers and describe their composition, properties and uses.
CO2	Discuss the properties and uses of engineering and speciality polymers in various applications.
CO3	Illustrate the common polymer processing techniques and explore the use of AM methods for processing polymers, metals and ceramics
CO4	Apply the knowledge of biomaterials for implants and other medical applications.
CO5	Discuss the properties and uses of engineering ceramics and their applications in various fields.

BL – Bloom's Taxonomy Levels
(L1-Remembering, L2-Understanding, L3-Applying, L4-Analysing, L5-Evaluating, L6-Creating)

PART- A (10 x 2 = 20 Marks)
(Answer all Questions)

Q.No.	Questions	Marks	CO	BL
1	Define the term: Elastomers. Give an example.	2	1	L1
2	Give the structure of polystyrene, and its common use.	2	1	L2
3	Recall the property that allows hydrogels to absorb large amounts of water?	2	2	L1
4	Give one example of a smart polymer and its application.	2	2	L2
5	State the principle of blow moulding.	2	3	L1
6	Recall one advantage and one limitation of thermoforming.	2	3	L1
7	Give two examples of Bioresorbable materials.	2	4	L2
8	Write a note on Shape Memory alloys.	2	4	L1
9	How is glass different from other ceramics in terms of atomic structure?	2	5	L2
10	Write a note on Partially Stabilized Zirconia.	2	5	L1

PART- B (5 x 13 = 65 Marks)

Q.No.	Questions	Marks	CO	BL
11 (a)	Discuss about the structure, properties and uses of NR, BR and SBR.	13	1	L4
	OR			
11 (b)	Explain the process of Vulcanization and Compounding of rubber.	13	1	L4
12 (a) (i)	What are conducting polymers? With suitable example, analyze the reason behind conducting nature of these polymers.	8	2	L4
(ii)	Differentiate thermoplastic polyurethanes and thermosetting polyurethanes.	5	2	L4
	OR			

12 (b) (i)	Analyze the structure-property relationship of PMMA.	8	2	L4
(ii)	Point out the major applications of polymer composites.	5	2	L4
13 (a)	With a neat diagram, explain Injection Moulding and Blow Moulding.	13	3	L4
	OR			
13 (b)	Analyze the significance of T_g, VST, HDT and MFI in determining the thermal and processing behavior of polymers.	13	3	L4
14 (a)	Analyze the structure-property relationships of stainless steel, cobalt-based alloys, and titanium alloys in the context of biomedical and engineering applications	13	4	L4
	OR			
14 (b)	Outline the properties and applications of polyolefins, polyacrylamides and fluoropolymers.	13	4	L4
15 (a)	Discuss the properties of tungsten carbide and boron nitride cermets and their typical engineering applications.	13	5	L2
	OR			
15 (b)	Discuss the functional properties and applications of Si_3N_4, SiAlON and TiN.	13	5	L2

PART- C (1 x 15 = 15 Marks)

(Q.No.16 is compulsory)

Q.No.	Questions	Marks	CO	BL
16. (i)	Analyze the role of polymers in fuel cells and energy storage devices. Summarize the current challenges in polymer development for sustainable energy systems.	10	2	L6
(ii)	Summarize the advantages and limitations of Additive Manufacturing in comparison to traditional manufacturing methods.	5	3	L6