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

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. MATERIALS SCIENCE AND ENGINEERING

MS23301 & Structure and Properties of Materials

(Regulation 2023)

Time:3hrs Max.Marks: 100

CO 1	Relate the connection between structure and properties of materials and explain different types of chemical bonds and their influence on properties
CO 2	Discuss on the similarities and differences in the symmetries of different crystal systems and Bravais lattices and index different planes and directions in crystals
CO 3	Explain the various defects in metals, ceramics, and polymers
CO 4	Elaborate on the different types of Solid solutions and gives an overview of Strengthening mechanisms
CO 5	Summarize the fundamental differences between metals, polymers and ceramics.

PART- A (10 x 2 = 20 Marks)

(Answer all Questions)

Q.No	Questions	Marks	CO	BL
1	List the three major important criteria in the materials selection process.	2	1	L1
2	What is the difference between atomic structure and crystal structure?	2	1	L1
3	Distinguish between crystalline and amorphous materials?	2	2	L1
4	What are stereographic projections?	2	2	L1
5	What is the difference between allotropy and polymorphism?	2	3	L1
6	What are point defects and give example?	2	3	L1
7	What are quasi-crystals?	2	4	L1
8	Distinguish between macro and microstructures?	2	4	L1
9	Define polymers?	2	5	L1
10	Give the applications of ceramic materials?	2	5	L1

PART- B (5 x 13 = 65 Marks)

Q. No.	Questions	Marks	CO	BL
11 (a)	Write about three primary classifications of solid materials and list the properties in the form of bar chart.	13	1	L2
	OR			
11 (b)	Explain in detail about atomic bonding in materials?	13	1	L2
12 (a)	Describe the seven crystal systems and fourteen Bravais lattices?	13	2	L2
	OR			
12 (b)	Analyze symmetry in crystals? Explain the non-translation symmetry?	13	2	L4
13 (a)	What is a dislocation? Classify the dislocations? Explain them using schematic diagrams? Differentiate between edge and screw dislocations?	13	3	L3
	OR			
13 (b)	Describe about grain boundaries and surface energy?	13	3	L2

14 (a)	What is extended solid solution and what rules are governing the extended solid solution?	**13**	4	L4
	OR			
14 (b)	Analyze the solid solution strengthening and grain size-based strengthening?	**13**	4	L4
15 (a)	Analyze the differences between thermoset and thermoplastic polymers?	**13**	5	L4
	OR			
15 (b)	Explain the functional properties of ceramics?	**13**	5	L2

PART- C(1x 15=15Marks)

(Q.No.16 is compulsory)

Q.No	Questions	Marks	CO	BL
16.	Explain in detail about precipitation strengthening mechanism?	**15**	4	L2

Endnote:

CO – Course Outcome; BL – Blooms' Taxonomy Level (L1 – Remembering, L2 – Understanding, L3 – Applying, L4 – Analyzing, L5 – Evaluating, and L6 – Creating); PO – Program Outcome; PI – Performance Indicator (Ref: AICTE-Examination Reform Policy, 2018)