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Roll No..... **Total No. of page(s): 2**

SE-MDQ/O-20: 5205
Phy-304-C: Material Science-I

Time: 3 hrs] **[Max. Marks: 60**

Note: Attempt **five** questions in all selecting **one** question from each unit. Question No. **1** is compulsory.

Compulsory Question

1	a	What is the significance of width of dislocation?	2
	b	Using RBS technique is it possible to distinguish between the isotopes of silver? Give reason for your answer.	2
	c	Why properties exhibited by pyrex glass are different from soda glass? Discuss.	3
	d	What is anelastic deformation? How it is related to damping capacity of materials?	3
	e	Draw phase diagram and corresponding free energy curves for a system exhibiting complete solid miscibility.	2

Unit – I

2	a	Dislocations responsible for formation of deformation twins are perfect of imperfect? Justify your answer.	2
	b	What are line defects? Discuss in detail various types of line defects present in crystals. Calculate the energy associated with any one type of line defect. On the basis of energy associated with line defects justify that they are non equilibrium defects.	10
3	a	What are grain boundaries? Elucidate in detail how and why crystals reduce area under grain boundaries?	8
	b	What are super dislocations? Justify that super dislocations are rarely found in crystals.	4

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UNIT – II

4 a	Estimate Young's modulus from the interatomic forces for a single atom in a crystal during elastic deformation.	6
b	What do you understand by strengthening? Discuss dispersion hardening and solution hardening.	6
5 a	What do you understand by fracture in materials? Discuss Griffith theory of brittle fracture.	6
b	What do you understand by Schmid's law? Expain. Also discuss the significance of Schmid factor	6

UNIT – III

6a	What is an equilibrium phase diagram? What information can be obtained from an equilibrium phase diagram? Draw and discuss equilibrium Eutectic equilibrium phase diagram.	9
b	Why in a substitutional solid solution solubility is restricted if the size difference between the solute atoms and solvent atoms is large?	3
7 a	Discuss in detail the mechanisms responsible for phase transformations, when the temperature of the material is altered.	9
b	Why Aluminium and Silver are not completely miscible? Explain.	3

Unit – IV

8 a	What is Ion implantation? Discuss the basic components of an ion implantation system giving a suitable diagram. Why high vacuum is required for this process?	6
b	Describe in detail ERDA technique. Why thin layer of polymer (mylar) is kept before detector in ERDA?	6
9	Discuss the principle, kinematics and instrumentation of RBS? In a back scattering spectrum, What information can be obtained from the ratio of height of the peaks and how?	12

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