

J.C. BOSE UNIVERSITY OF SCIENCE & TECHNOLOGY, YMCA FARIDABAD
M.SC (PHYSICS) SEM-IV EXAMINATION
MATERIAL SCIENCE (PHY- 404A) (Reappear)

Max. Marks:60

Time: 3 Hours

- Instructions:**
1. It is compulsory to answer all the questions (2marks each) of Part -A in short.
 2. Answer any four questions from Part -B in detail.
 3. Different sub-parts of a question are to be attempted adjacent to each other.

PART -A

- Q1 (a) What is ion irradiation? (2)
(b) Define the term nucleation. (2)
(c) Differentiate between elastic and plastic materials. (2)
(d) How does carburization increase the strength of steel? (2)
(e) What is the difference between eutectic and peritectic reactions (2)
(f) What is Duralumin? How can we improve the mechanical properties of Duralumin? (2)
(g) What is a twin interface? What is its significance? (2)
(h) What is Burger's vector? (2)
(i) In high energy radiation, what energy loss mechanism dominates? (2)
(j) Explain brittle fracture. (2)

PART -B

- Q2 (a) Derive the expression for equilibrium concentration of Scottky defects, (5)
(b) Derive the Nemst-Einstein relation in phase transformation. (5)
- Q3 (a) What is Rutherford backscattering spectrometry? Discuss it in detail. (5)
(b) Using Gibb's phase rule, determine the minimum and maximum phases that can exist for pure metals. (5)
- Q4 (a) Differentiate between slip and twinning with the help of an example. (5)
(b) What is hot and cold working? Explain their effect on the properties of materials. (5)
- Q5 Draw the continuous solid solution phase diagram and explain the lever rule. (10)
Also explain the significance of solvus line?
- Q6 (a) Differentiate between Inelastic and Viscous deformation giving an example each of both kinds. (5)
(b) What is strain hardening? Explain the change in properties of materials when annealed at successively high temperatures. (5)
- Q7 Write short notes on: (5x2)
(a) Ion Beam characterization Technique
(b) Secondary Ion Mass Spectroscopy (SIMS)