

MATS-201
[ETD]

Roll No.

END SEMESTER EXAMINATION: NOV.- DEC., 2014
MATERIAL SCIENCE

Time : 3 Hrs.

Maximum Marks : 70

Note: *Attempt questions from all sections as directed.*

SECTION – A (30 Marks)

Attempt any 5 questions out of six.

Each question carries 6 marks.

1. Explain BCC, FCC, HCP lattice structure? Derive the number of effective atoms per unit cell and atomic packing factor for each of these.
2. Explain Miller Bravais Indices and their significance in material science.
3. Explain Bragg's law of diffraction? How X-rays are used to find the interplaner spacing in crystal lattice.

P.T.O.

4. Calculate the number of Frenkel defect per unit volume of calcium fluoride. if the energy of defects formation is 4.7eV at 1200 K. The molecular weight of CaF_2 is 0.054 kg/mol and the specific gravity is 4.04.
5. Explain the Isothermal Transformation diagram of steel?
6. Explain energy band theory stating the assumptions made therein?

SECTION – B (20 Marks)

Attempt any two questions out of three.

Each question carries 10 marks.

7. Explain the mechanisms of plastic deformation. What are various types of point imperfections that occur during the crystal growth?
8. Iron has a BCC structure. Its atomic weight is 55.85 gm/mol and atomic radius is 0.124nm. Find out the density and also the volume of the unit cell.

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9. Explain different types of Heat treatments in detail?

SECTION – C (20 Marks)

(Compulsory)

10. (a) Draw (110) and (111) planes and [110] and [111] directions. (6)

(b) Copper has FCC structure and the atomic radius is 1.278 Å. Calculate the density of Copper crystal? Take atomic weight of Copper is 63.5 and Avogadro's number is 6.023×10^{23} . (6)

(c) Draw Iron Carbon Diagram & discuss in detail? (8)