Code No: NR211801 **NR**

II B.Tech I Semester Supplementary Examinations, November 2006
PHYSICAL METALLURGY
(Metallurgy & Material Technology)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What are lenses? Name different types of lenses and briefly explain each one of them.
   (b) Name the factors by which optical characteristics of lenses are determined and briefly discuss. [8+8]

2. (a) With the help of unit cell of BCC, FCC and HCP structures calculate the effective number?
   (b) What is packing factor? Calculate the packing factor for BCC crystals and compare with that of FCC crystals.
   (c) The atomic radius of FCC metal is 1.26 A^0. Calculate its lattice parameter. [6+6+4]

3. (a) Define planar density and estimate the planar density value of (111) plane in BCC and FCC unit cells. Support with due calculations.
   (b) Which crystallographic planes and directions in BCC, FCC and HCP structures have highest atomic density? [8+8]

4. (a) What is a solid solution? Give the classification and explain the rules for the formation of solid solutions.
   (b) Explain why atomic size difference is only 4.2% still Zn can dissolve up to 38.4% in Cu? [8+8]

5. (a) Assuming a spherical nucleus and negligible strain effects, calculate the critical radius of nuclei for homogeneous nucleation.
   (b) Determine the effect of temperature and time on nucleation rate. [9+7]

6. Explain any THREE of the following:
   (a) Incongruent melting alloys
   (b) PSUEDO-EUJECTIC alloys.
   (c) Construction of phase diagrams by Metallographic method.
   (d) Raoult's law. [16]

7. The Microstructure of a Fe-Fe_3C alloy consists of pro-eutectiod Ferrite & Pearlite. The mass fractions of these two-constituents are 0.286 & 0.714 respectively. Determine the concentration of carbon in this alloy. [16]

8. (a) Draw the T-T-T diagram for a eutectoid steel label the various regions & lines. Explain the effect of various elements on the position and shape of T-T-T diagram..
   (b) Explain the Pearlitic & Martensitic transformation. [8+8]

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