Date on which the problems were given: 08 August 2016

Submit your assignment in the class of 16th August 2016

Assignment 1:

1) What are the Miller Bavais indices of the plane normals of the following crystallographic planes: $(2\bar{1}\bar{1}0)$, $(\bar{1}2\bar{1}0)$, and $(\bar{1}\bar{1}20)$?

2) Write down the first six peaks in XRD profile for the following crystals: simple cubic, FCC and BCC.

3) What is the ratio of interplanar spacing of (111) plane to that of (221) plane?

4) Derive the ideal c/a ratio of a HCP crystal.

5) What is the angle between (111) and (200) planes?

6) The number of vacancies in a metal increases by a factor of six when the temperature is increased from 800K to 1000K. Calculate the energy for vacancy formation assuming that the density of the metal remains the same over this temperature range.

7) Derive the minimum cation to anion ratio for coordination number 4 for which the cation-anion contact is established.

8) Calculate the planar density of (110) plane of FCC crystal.

9) What are the properties that the material should possess for application in cylinder block component of an automobile engine? What are the different materials (atleast mention the material system with the major elements' names) that are used for making this component?

10) What are the angles between the Burger's vectors and the dislocation line directions for the following types of dislocations: Edge dislocation and Screw dislocation.