Engineering Materials (UES012)
School of Physics and Materials Science
Tutorial Sheet No 5

1. Cu has FCC structure and its atomic radius is 1.278Å. Calculate the theoretical density of Cu. Atomic weight of Cu is 63.54 gm/mole.
2. Draw the section of graphite structure. All C-C bonds in the layer are 1.42 Å and the distance between layers is 3.44 Å. Calculate the density of graphite.
3. Zn has HCP structure and height of the unit cell is 4.94 Å, atomic wt. of Zn is 65.37 gm/mole. Calculate the volume of the unit cell and density of Zn.
4. Ti undergoes a phase change from BCC to HCP at 880°C on cooling. Calculate the percentage change in the volume. Given lattice parameter a_{BCC} = 3.32 Å, a_{HCP} = 2.956 Å, c = 4.683 Å.
5. Iron (atomic weight 56.05 gm/mole) change from BCC to FCC at 910 °C. At this atomic radius of iron is 1.258 Å in BCC and 1.298 Å in FCC. What is the percentage of (a) volume change and (b) linear change in iron when heated through this temperature range?
6. Calculate the packing efficiency of (a) close packed structures (FCC and HCP) (b) monoatomic BCC and SC crystals.
7. Find the diameter of the largest atom that would fit an interstitial void in FCC nickel without distortion.
8. Find the size of the largest sphere that will fit an interstitial void in a BCC crystal as a function of the atomic radius r. The void is located at (0, ½, ¼) and the other equivalent positions.
9. Aluminum has FCC structure. Its density is 2700 Kg/m^3. Calculate the unit cell dimension and the atomic diameter.