HA1 (EE2187)

1. Silicon (Si) has a diamond crystal structure. Answer the following questions about Si. (Assume a lattice spacing of a = 5.42 Angstroms.)

a) Calculate the distance between {100}, {110}, and {111} planes.

b) Compute the density of Si atoms per cm2 on {100}, {110}, and {111} planes.

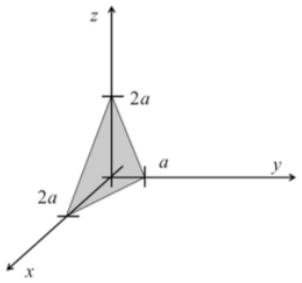
c) Treat atoms as rigid spheres with radii equal to one-half of the distance between nearest neighbours. Compute the percentage of volume occupied by the Si atoms.

d) What is the density of Si in gm/cm3?

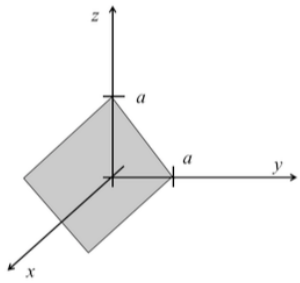
e) How many atoms/cm3 are there in Si?

2. Determine the Miller indices for the following planes along with the directions normal to each plane.

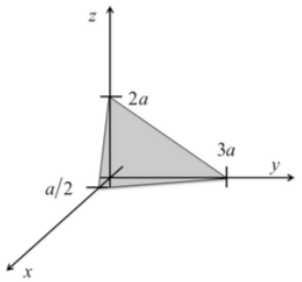
a)



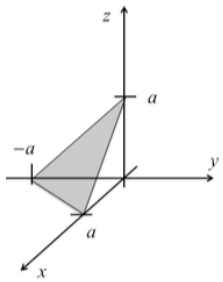
b)



c)



d)



3. Sketch the following

a) (010) b) [010]c) (203) d) (111)

4.Surface of Si wafer is a (100) plane.

a) Sketch the placement of Si atom on surface of wafer

b) Determine no of atoms/cm2.

c) Repeat a and b taking the surface of Si wafer to be (110) plane.