

Physics – BS 102

B.E. (Chemical) – 1st Semester (MID-SEM-II – Jan 2022)

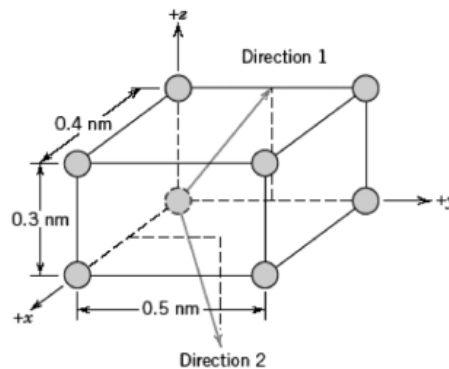
Max. Time: 1 hr

Max. Marks: 30

Instructions: Attempt all questions and assume the values, wherever necessary.

- Q.1 Short Answer questions (may explain briefly) (2*5=10)
- Write down the electronic structure of Aluminium atom.
 - What type of the unit cell Iron (Fe) is assigned?
 - In a square lattice $[11]$ and $[1\bar{1}]$ are in the same family. True or False
 - For a face centered cubic (FCC) unit cell the coordination number is 8. True or False
 - The atomic fraction in a body centered cubic unit cell is 0.74. true or false

- Q.2
- List the point coordinates for all atoms that are associated with the FCC unit cell. (5)
 - What are the indices for the directions indicated by the two vectors in the sketch below? (5)



- Q.3
- Show for the body-centered cubic crystal structure that the unit cell edge length a and the atomic radius R are related through $a = 4R/\sqrt{3}$. (5)
 - The unit cell for tin has tetragonal symmetry, with a and b lattice parameters of 0.583 and 0.318 nm, respectively. If its density, (5)

atomic weight, and atomic radius are 7.30 g/cm^3 , 118.69 g/mol , and 0.151 nm , respectively, compute the atomic packing factor.

OR (attempt (b) or (c))

(c) Determine indices for the directions shown in the following (5)
hexagonal unit cells:

