Thapar Institute of Engineering and Technology
School of Physics and Materials Science
Engineering Materials (UES012)
ODD Semester 2023 - 24 (July – Dec 2023)

Tutorial Sheet No. 3

1. Check whether symmetry exists and draw the following crystallographic planes in a hexagonal unit cell.

   (a) $(01\bar{1}0)$ (b) $(\bar{1}0\bar{1}0)$ (c) $(\bar{1}2\bar{1}0)$ (d) $(10\bar{1}2)$ (e) $(01\bar{1}\bar{1})$

2. Draw a hexagonal unit cell and show the following planes in it:

   (a) $(1\bar{2}12)$ (b) $(\bar{1}100)$ (c) $(1\bar{1}01)$ (d) $(\bar{2}111)$ (e) $(12\bar{1}0)$

3. Draw a hexagonal unit cell and show the following directions in it:

   (a) $[\bar{1}100]$ (b) $[2\bar{1}\bar{1}0]$ (c) $[11\bar{2}3]$ (d) $[\bar{1}111]$ (e) $[2\bar{4}23]$

4. Determine the Miller indices of cubic crystal plane that intersects the position coordinates (1,1/4, 0), (1,1,1/2), and (3/4,1,1/4).

5. Compare packing fractions for HCP and FCC lattices.

6. Gold has an atomic weight of 197 gm/mole and a 19.3 gm/cc density. What is the spacing between atoms in solid gold?

7. Tungsten has a BCC structure, and its atomic radius is 0.162 nm. Calculate the theoretical density. The atomic weight of W is 183.8 gm/mole.