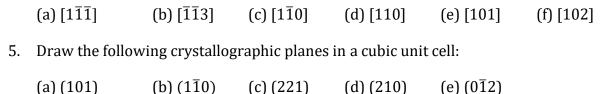**Thapar Institute of Engineering and Technology**
School of Physics and Materials Science
Engineering Materials (UES012)
ODD Semester 2023 - 24 (July – Dec 2023)

Tutorial Sheet No. 2

1. Why 2-D pentagon lattice is not possible?

2. Which crystal systems are the least and most symmetric? Explain with reason.

3. Show that FCT does not exist in the Bravais Lattice list.

4. Draw the following directions in a cubic unit cell.

    (a) $[1\bar{1}\bar{1}]$ (b) $[\bar{1}\bar{1}3]$ (c) $[1\bar{1}0]$ (d) $[110]$ (e) $[101]$ (f) $[102]$

5. Draw the following crystallographic planes in a cubic unit cell:

    (a) (101) (b) $(1\bar{1}0)$ (c) (221) (d) (210) (e) $(0\bar{1}2)$

6. Draw a cubic unit cell and show the following planes in it:

    (a) $(21\bar{2})$ (b) $(1\bar{2}0)$ (c) $(12\bar{2})$ (d) $(20\bar{3})$ (e) $(\bar{3}1\bar{2})$ (f) $(2\bar{2}3)$

7. Compute and compare the linear densities for $[100]$, $[110]$ and $[111]$ for FCC copper. Given $a = 0.3615$ nm.

8. For Sodium (BCC), calculate the linear atomic density along $[100]$, $[110]$, and $[111]$ directions if the radius of an atom is $r = 0.186$ nm.

9. Compute the planar density for the FCC Gold (100), (111) and (110) planes in terms of atomic radius r.

10. Calculate the planar density for (100), (110) and (111) plane of BCC Iron. The lattice constant of iron is 0.287 nm.