## 1. Face centered cubic structure (FCC):

In a FCC structure eight atoms are at the corners of the unit cell and six atoms are present at the center of the six faces. The center atom is surrounded by 12 points. The co-ordination number is 12. Each corner atom is shared by 8 unit cells and the face centered atom is shared by 2 surrounding unit cells.

$\therefore$ The number of atoms per unit cell is $= \frac{1}{8} \times 8 + 6 \times \frac{1}{2} = 4$

Atomic radius of face centered cube
AB $= 4r$
$(AB)^2 = a^2 + a^2$
$(4r)^2 = 2a^2$

Lattice Constant a $= \dfrac{4r}{\sqrt{2}}$
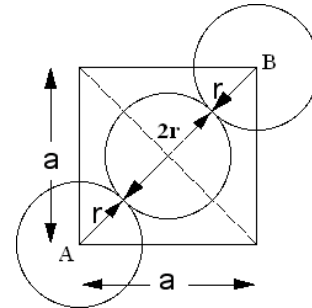
Nearest neighbor distance 2r $= \dfrac{a \ \sqrt{2}}{2}$

Volume of all the atoms in unit cell v $= 4 * (4/3) \pi r^3$

Volume of unit cell V $= a^3 = 64 r^3 / 2 \sqrt{2}$

$\therefore$ The packing factor $= v/V = \sqrt{2}\pi/6 = 74\%$

Parameters	SC	BCC	FCC
Co-ordination number	6	8	12
Atomic Radius (r)	$a/2$	$\sqrt{3}a/4$	$\sqrt{2}a/4$
Atoms per unit cell	1	2	4
Atomic packing factor	$\pi/6$	$3\pi/8$	$2\pi/6$