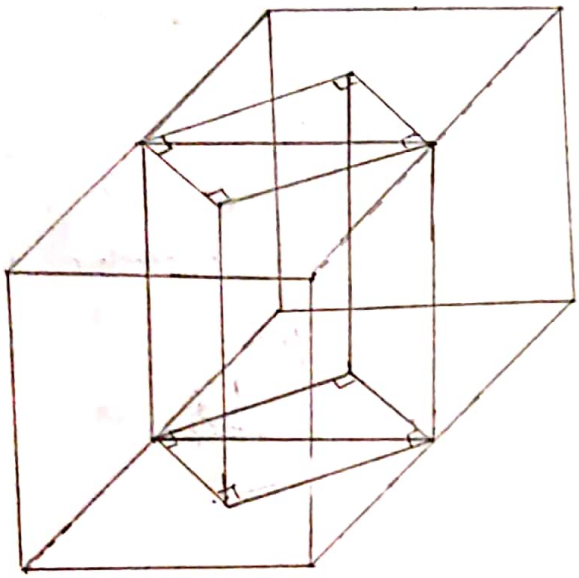
Q3) 1)

a) Show that base centered (c) tetragonal lattice is equivalent to Primitive tetragonal lattice



As we can see:

Base centered Tetragonal lattice with lattice parameters

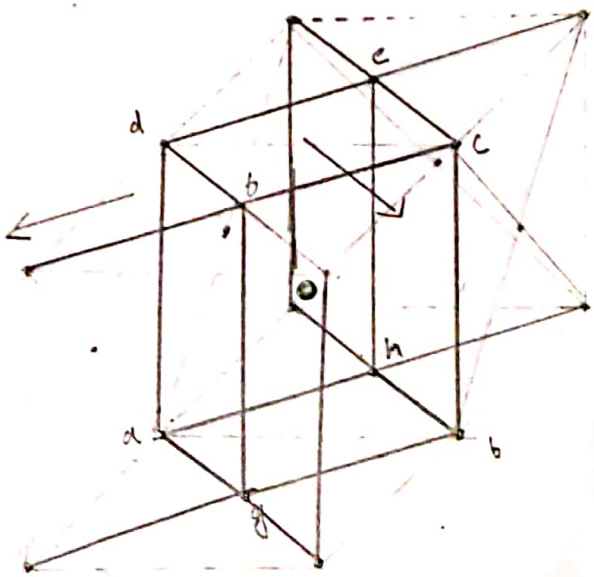
$a = b \neq c \qquad \alpha = \beta = \gamma = 90°$

is just a primitive tetragonal cell with

$a' = \frac{a}{\sqrt{2}}$, $b' = \frac{b}{\sqrt{2}} = \frac{a}{\sqrt{2}} = a'$,

$c' = c$, $\alpha = \beta = \gamma = 90°$

b) Face centered (F) tetragonal lattice is equivalent to body centered (I) tetragonal lattice. (Cell parameters will be same as above)



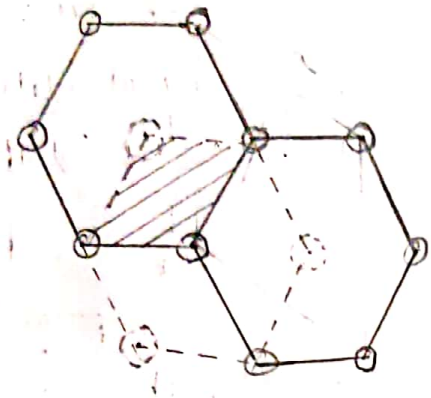
The atom at the center of the face abcd of the Face centred lattice is also the body centre of the tetragonal unit cell agbh d fc e

On extending this unit cell in the direction indicated by the arrows, we get the entire Body centered crystal.

Q3) 2)

i) Graphite has a hexagonal structure.

It's primitive unit cell is given below (Top view)



The solid lines indicate 1st layer while dashed lines are second layer. The area shaded represents the top face of the primitive unit cell (a = b = side of hexagon)
c = distance between 1st and 3rd layer

Each 3-D unit cell contains 1 atom.