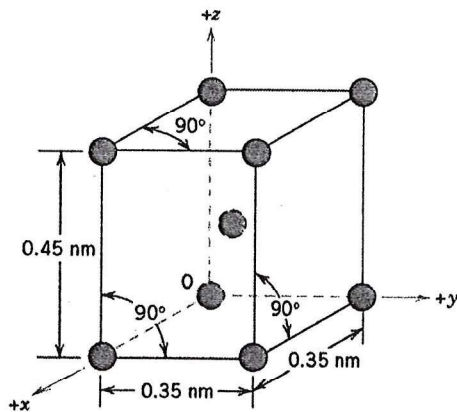1. Show that the atomic packing factor for HCP is 0.74. (10%)

2. The accompanying figure shows a unit cell for a hypothetical metal. (30%)

   (a) To which crystal system does this unit cell belong?

   (b) What would this crystal structure be called?

   (c) Calculate the density of the material, given that its atomic weight is 141 g/mol.

3. What is the composition of Pb and Sn, respectively, **in atom percent**, of an alloy that consists of 5.5 wt% Pb and 94.5 wt% Sn? (the atomic weights of Pb = 207.2 g/mol. the atomic weights of Sn = 118.71 g/mol) (10%)

4. Please explain the following nouns: (10%)

(a) Annealing(4%)

(b) Binary-Eutectic Systems(3%)

(c) Ductility(3%)

5. What are stages of moderately ductile failure?(20%)

6. What is criterion for crack propagation? (20%)