

1. What are the preferred methods for synthesis of SiO_2 , CdSe , GaAs , Au and Fe_2O_3 nanoparticles? Give one sentence justification. [20]

2. A sheet of graphene is folded about the C_h axis as shown. Comment on the conducting properties and estimate the diameter of the nanotube formed. (Use carbon-carbon bond 1.4 Å) [10+10]

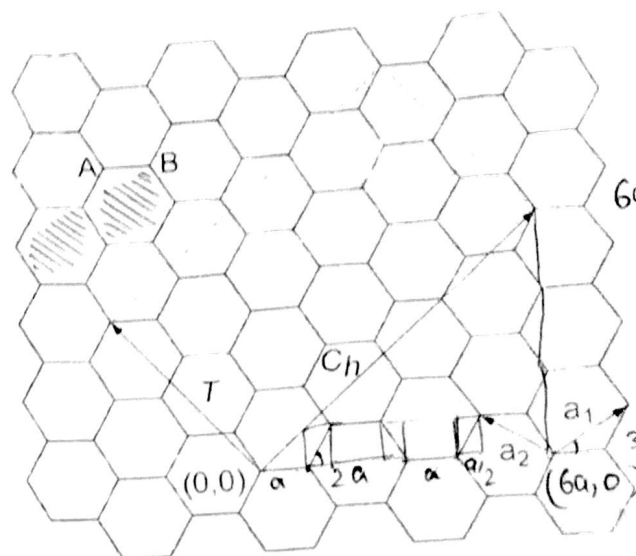
3. Comment on the electronic structure of conducting and semiconducting nanotubes near the Fermi energy with the help of plots. [20]

4. What are the roles of organic ligands in nanoparticles? List at least three. [10]

5. What is the need to separate nucleation from growth? [10]

6. Why can we not observe ferromagnetism in 10 nm nanoparticles? [10]

7. We have not discussed as to what happens to the melting point of a metal as the size of the particles is decreased. Comment on this with a brief (< half page) argument. [10]



$$\cos 60 = \frac{1}{2} =$$

