Assignment -I

1. State Gibbs phase rule. Schematically prove it. [10]

2. Show how a binary isomorphous phase diagram (of element A and B) is constructed if you have free energy vs composition behavior known for Liquid and one single solid solution phase (say α) at different temperatures starting from T_l (assume, $T_l > T_m^A > T_m^B$, where, T_m^i is the melting point of element '*i*') to T_n (assume, $T_n < T_m^B < T_m^A$). [15]

3. Show a binary eutectic phase diagram (of element A and B) then show free energy vs composition behavior for Liquid and solid solution phases (say α and β) at different temperatures starting from T_l (assume, $T_l > T_m^A > T_m^B$, where, T_m^i is the melting point of element '*i*') to T_n (assume, $T_n < T_m^B < T_m^A$). [15]

4. Show Fe-Fe_3C phase diagram neatly with respective temperatures and compositions. [10]