USN | | | | | | | | | | 10NT34

Third Semester B.E. Degree Examination, Dec.2015/Jan.2016
Physical and Chemical Principle of Nanotechnology

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, selecting atleast TWO questions from each part.*

PART – A

1   a. Write a note on Einstein and Debye theories of molar heat capacity.   (10 Marks)
    b. What are Phonons? Write a brief note on concept of phonons.   (05 Marks)
    c. Explain briefly about lattice vibrations.   (05 Marks)

2   a. Give a brief account on Brillion zones and Krong Penry model.   (10 Marks)
    b. Explain Hall effect with derivation.   (05 Marks)
    c. What are quantum dots? Give any six applications.   (05 Marks)

3   a. Write a brief note on intrinsic semiconductor and extrinsic semiconductor with example.
                                                                                      (10 Marks)
    b. Explain i) P – n junction and rectification   ii) Tunneling   iii) Resonant tunneling.
                                                                                      (10 Marks)

4   a. Define i) Heat capacity ii) Enthalpy iii) Entropy.   (06 Marks)
    b. Write a note on first law of thermodynamics and second law of thermodynamics.
                                                                                      (10 Marks)
    c. What is phase rule? Briefly explain.   (04 Marks)

PART – B

5   a. Explain the microcanonical , canonical and grand canonical ensemble and their connections.
                                                                                      (10 Marks)
    b. Give an account on Boltzmann statistics with derivation.   (10 Marks)

6   a. Explain in detail about electro chemical processes.   (10 Marks)
    b. Write a note on Theory of solutions.   (05 Marks)
    c. Give an account for calculation of thermodynamic equilibrium.   (05 Marks)

7   a. Record the applications of diffusion and account for mechanism for diffusion and activation
        energy for diffusion.   (10 Marks)
    b. Write a note on generation of point defects.   (05 Marks)
    c. Give a note on Kirkendall effect.   (05 Marks)

8   a. Describe five factors responsible for molecular self assembly.   (10 Marks)
    b. Write a note on :
        i) Self assembly using solid surfaces.
        ii) Self assembly in fluid media.   (10 Marks)

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