CBCS SCHEME

USN | | | | | | | | | | |

15NT35

Third Semester B.E. Degree Examination, June/July 2018
Physical and Chemical Principles of Nano Technology

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Define quantum mechanics. State uncertainty principle with an example and add a note on complementoriy. **(05 Marks)**

b. State and explain dual nature of matter by debrogllie. **(03 Marks)**

c. Derive an expression for uncertainty principle with help of localization experiment. **(04 Marks)**

d. Enumerate Planck's hypotheses. **(04 Marks)**

OR

2 a. Give a brief note on valance Bond theory and its applications. **(05 Marks)**

b. Write a brief note on molecular orbital theory and its application. **(06 Marks)**

c. Write a short note on computational chemistry and name few applications. **(05 Marks)**

Module-2

3 a. Define thermodynamics. Write a note on importance and limitations of thermodynamics. **(08 Marks)**

b. State and explain the first law of thermodynamics with mathematical expressions. **(08 Marks)**

OR

4 a. Define entropy. Give a brief note on the illustration of the concept of entropy. **(06 Marks)**

b. Explain the concept of heat capacity at constant volume and constant pressure. **(06 Marks)**

c. What is spontaneous process? Write the criteria for spontaneity. **(04 Marks)**

Module-3

5 a. Explain Debye theory of molar heat capacity and limitations. **(08 Marks)**

b. Derive Kronig–Penny model. **(08 Marks)**

OR

6 a. Explain classical theory of molar heat capacity and limitations. **(06 Marks)**

b. Distinguish between metal, insulator and semiconductor. **(06 Marks)**

c. Discuss the concept of Lattice vibrations and thermal heat capacity. **(04 Marks)**

Module-4

7 a. Explain the following :
   i) Intrinsic semiconductors
   ii) Extrinsic semiconductors. **(08 Marks)**
   b. Discuss the concept of tunnelling. **(04 Marks)**
   c. Explain brief about classical and quantum tunnelling. **(04 Marks)**

OR

8 a. Explain briefly P-N junction semiconductor diode and give its advantages. **(10 Marks)**
   b. Write a note on rectification. **(06 Marks)**

Module-5

9 a. Discuss the following optical properties of colloids :
   i) Visibility ii) Colour iii) Tyndall effects. **(06 Marks)**
   b. Write about the following electric properties of colloids :
   i) Electrophoresis
   ii) Electro osmosis. **(06 Marks)**
   c. Write a note on classification of emulsions with example. **(04 Marks)**

OR

10 a. Explain the classification of colloids based on the nature of dispersed phase with example. **(06 Marks)**
   b. Explain about crystalloids and colloids. **(04 Marks)**
   c. Explain the following dynamic properties of colloids :
   i) Brownian movement
   ii) Sedimentation
   iii) Diffusion. **(06 Marks)**

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