[4061] – 102

F.E. (Semester – I) Examination, 2011
APPLIED SCIENCE – I (Chemistry)
(2008 Pattern)

Time : 2 Hours Max. Marks : 50

Instructions *: 1) Solve* ***Q. 1*** *or* ***Q. 2****,* ***Q. 3*** *or* ***Q. 4****, and* ***Q.5*** *or* ***Q.6****.*
2) ***Neat*** *diagrams must be drawn* ***wherever*** *necessary.*
3) Black figures to the ***right*** *indicate* ***full*** *marks.*
4) ***Use*** *of logarithmic tables, slide rule, Mollier charts, electronic pocket calculators and steam stables is* ***allowed****.*
5) Assume suitable data, if ***necessary****.*

1. a) What is meant by crystal defects ? State the effects of crystal defects on the properties of crystal. Compare Schottky and Frenkel defects. **7**

   b) i) Show that radius ratio for ionic crystals with co-ordination no. 3 is 0.155. **4**

   ii) Convert the following Weiss indices of the following planes into Miller's Indices.

   a) (2, 1,2) b) (3, –1, 1) **2**

   c) What are carbon nanotubes ? State different types of carbon nanotubes and give their applications. **4**

OR

2. a) Define Atomic Packing Factor (APF). Calculate APF for SC, BCC and FCC unit cells of cubic crystal. **7**

   b) Define co-ordination no.. Explain co-ordination no. with respect to cubic crystal system. **6**

   c) At what glancing angle would the first order diffraction from (110) plane of Nacl be observed using X-ray of wave length 150 pm. The dimension of unit cell is 300 pm. **4**

P.T.O.

3. a) Explain Ostwald's theory of pH indicators. **6**

   b) Calculate the equivalent weight of $KMnO_4$ in acidic, alkaline and neutral medium. **6**

   c) Define primary standard solution. Give examples of primary standard solutions used in redox titration, precipitation titration and complexometric titration. **4**

OR

4. a) How hardness of water is determined using complexometric titration ? **6**

   b) i) Find the pH of the solution after adding 18 ml and 26 ml of 0.2 N NaOH solution to 25 ml of 0.2 N HCl in the titration. **4**

   ii) 100 ml of NaCl solution when titrated with 0.05 N $AgNO_3$ requires 36.5 ml in Mohr's method for the end point. Calculate amount of chloride ions per lit. of NaCl soln. **2**

   c) State the different types of indicators used in direct redox titration with example. **4**

5. a) Explain addition polymerization on the basis of free-radical reaction mechanism with suitable example. **7**

   b) Compare : **6**

   i) Thermosoft and Thermoset polymers

   ii) Natural rubber and vulcanized rubber.

   c) Explain various stages involved in polymer dissolution. **4**

OR

6. a) What are plastics ? Discuss various compoundings of plastics. **7**

   b) Give synthesis, properties and applications of **any two** : **6**

   i) Polystyrene (PS)

   ii) Polypropylene (PP)

   iii) Neoprene rubber

   iv) Silicone Rubber.

   c) Write a short note on : Conducting polymers. **4**

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