Total No. of Questions : 6]

SEAT No. :

P1958

[Total No. of Pages : 3

F.E. (Semester - I)

APPLIED SCIENCE - I

(Applied Chemistry)

(2008 Pattern)

Time :2 Hours] *[Max. Marks :50*

Instructions to the Condidates:

1) ***Solve Q1 or Q2, Q3 or Q4 and Q5 or Q6.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) What symmetry elements are present in a crystal? Discuss the symmetry elements present in a cubic crystal. **[7]**

b) i) Differentiate between Frenkel and Schottky defects. **[3]**

ii) Define - Unit cell and space lattice. **[2]**

c) Write a short note on fullerene. **[5]**

OR

Q2) a) What is atomic packing factor (APF)? Calculate the APF for SC,BCC and FCC system. **[7]**

b) i) Derive Bragg's law of crystallography. **[3]**

ii) Draw the crystal planes represented by the following Miller indices: (100) and (101). **[2]**

c) Explain types of single walled carbon nanotubes with their properties and applications. **[5]**

P.T.O.

Q3) a) Explain the titration curve for titration of a strong acid with a strong base. **[6]**

b) i) 25 ml of a 0.01 N $ZnSO_4$ solution was titrated with disodium EDTA at pH 9-10 using EBT as indicator to get end point at 23.8 ml. 50 ml of a hard water sample containing calcium ions required 14.5 ml of the same EDTA solution. Calculate calcium ions per liter in the water sample. **[3]**

ii) 100 ml of a 0.1 N weak acid ($Ka = 1.8\times10^{-5}$) is titrated against 0.1 N NaOH solution. Calculate the pH of the tirration mixture

a) before start of titration

b) after 55 ml of NaOH is added. **[3]**

c) Differentiate between - End point and Equivalence point, Normality and Molarity. **[4]**

OR

Q4) a) How is concentration of total calcium and magnesium ions in a sample determined by EDTA titration method? **[6]**

b) i) 25 ml of a 0.025N KCl solution required 18.6 ml of $AgNO_3$ solution during standardization using Mohr's method. 100ml of a water sample containing chloride ions required 11.7 ml of the same $AgNO_3$ solution for end point. Calcultate the chloride ions per liter in the water sample. **[3]**

ii) 25 ml of 0.1N HCl is titrated with 0.1 N KOH. Find the pH of solution when.

a) 15.5 ml of 0.1N KOH is added and.

b) 26 ml of 0.1N KOH is added. **[3]**

c) Explain the terms: titrant, titrand, indicator, standard solution. **[4]**

Q5) a) Explain the mechanism of free radical polymerization of ethylene. **[6]**

b) i) Discuss with examples the role of filler during compounding of plastics. **[3]**

ii) Give the preparation, properties and applications of SBR. **[3]**

c) Write a short note on bio-degradable polymers. **[5]**

OR

Q6) a) Explain the structure of natural rubber. What are the drawbacks of natural rubber and how are they overcome by process of vulcanization? **[6]**

b) i) Discuss with example the role of plasticizer in compounding of plastic. **[3]**

ii) Give the preparation, properties and applications of Polystyrene. **[3]**

c) Write a short note on conducting polymers. **[5]**