

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 Candidates:*

- 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 ( $K_a = 1.8 \times 10^{-5}$ ) is titrated against 0.1 N NaOH solution. Calculate the pH of the titration 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. Calculate 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]

