



[4161] – 102-C

Seat No.	
----------	--

F.E. (Semester – I) (2008 Course) Examination, 2012
APPLIED SCIENCE – I
(Chemistry)

Time : 2 Hours

Max. Marks : 50

- Instructions :** 1) Solve Q. 1 or Q. 2, Q. 3 or Q. 4, 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 calculator and steam tables is **allowed**.
5) Assume **suitable** data, if necessary.

1. a) What are the type of symmetries for crystals ? Explain them for a cubic crystal. 7

b) i) Draw following planes in a cubic system ; a) 1 0 0 b) 1 1 1

ii) Define :

- a) Atomic packing factor
- b) Co-ordination number
- c) Radius ratio
- d) Unit cell

6

c) Derive Bragg's law of diffraction.

4

OR

2. a) What is a liquid crystal phase ? State types of liquid crystals and applications of liquid crystal. 7

b) i) Show that radius ratio for ionic crystal with co-ordination number 4 is 0.225.

4

ii) Explain electrical conductivity in polythiophene.

2

c) Compare : SC, BCC and FCC unit cell regarding :

- i) Co-ordination number ii) AP
- iii) Atomic radius iv) Atoms per unit cell.

4

P.T.O.



3. a) How are the pH of titration mixture calculated at various stages during strong acid strong base titration ? 6
- b) i) 20 ml of standard solution of 0.04 M KCl takes 35.5 ml of AgNO_3 from burette, during standardization of the AgNO_3 . 100 ml of water sample requires 12.5 ml of the AgNO_3 solution. Calculate chloride content per litre in the given water sample. 4
- ii) 50 ml of a solution containing Ca^{++} is titrated against 0.035 M disodium EDTA from burette to get the end point 20.4 ml, in the complexometric titration. Calculate the amount of Ca^{++} ions per litre of the solution. 2
- c) Explain the different indicators used in direct titration method. 4
- OR
4. a) What is precipitation titration ? Explain Mohr's method for determination of Cl^- ions. 6
- b) i) Find the pH of the solution when 10 ml of 0.2 N HCl is added to 25 ml of 0.1N NH_4OH in a titration. 4
- ii) 50 ml sample water containing Mg salts, when titrated with 0.05 M EDTA requires 41.5 ml for the end point. Calculate Mg ions present per litre of the water sample. 2
- c) Define: i) Titrant ii) Titrand iii) Indicator iv) Equivalence point. 4
5. a) What is addition polymerization ? Explain cationic mechanism with example. 7
- b) Give synthesis, properties and applications of **any two** : 6
- i) Poly Vinyl Chloride (PVC)
- ii) Acrylonitrile butadiene styrene (ABS) plastics
- iii) Styrene – butadiene rubber (SBR)/ GR-S.
- iv) Poly propylene (PP).
- c) Write a note on liquid crystal polymers. 4
- OR
6. a) What is Glass transition temperature ? What are the factors affecting it ? State its importance. 7
- b) Distinguish: i) Addition and condensation ii) LDPE and HDPE 6
- c) Give preparation, properties and uses of Epoxy resin. 4