

May - June - 2012

[4161] – 102



Seat No.	
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F.E. (Semester – I) Examination, 2012
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 Tables is **allowed**.

5) Assume suitable data, if **necessary**.

1. A) State law of symmetry. Explain various elements of symmetries for a cubic crystal with figures. 7
- B) Explain structure, properties and applications of fullerene. 6
- C) At what glancing angle would the first order diffraction from (110) plane KCl observed using X-rays of wavelength 160 pm. The dimension of the unit cell is 320 pm. 4

OR

2. A) What are crystal defects ? What are the effects of crystal defects on the properties of crystal ? Distinguish between Schottky and Frenkel defects in ionic crystals. 7
- B) Define radius ratio for ionic crystals and give its significance. 6
- C) What is a liquid crystal phase ? Give its applications. 4

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3. A) Explain the titration curve for the titration of acetic acid and sodium hydroxide . Suggest the suitable indicator for this titration and give formulae to calculate pH at different stages of titration. (Assume sodium hydroxide solution in burette.)

7

- B) i) 50 ml water sample containing Ca salts, when titrated with 0.02 M EDTA requires 20.5 ml for the end point. Calculate amount of Ca^{+2} ions present per litre of the water sample.

- ii) The given chloride ion solution was diluted with distilled water to 1 litre. 25 ml of this diluted solution when titrated with 0.25 N AgNO_3 required 22 ml for the end point in Fajan's method. Calculate amount of Cl^- ions present per litre in the given solution.

6

- C) Define :

- i) Redox titrations
- ii) Equivalence point
- iii) Oxidizing agent
- iv) Normality.

4

OR

4. A) What is meant by precipitation titration ? Explain Mohr's method for determination of Cl^- ions with chemical equations, procedure and calculation.

7

- B) Calculate equivalent weights of following :

- i) Potassium permanganate (KMnO_4) in acidic medium.
- ii) Oxalic acid ($\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$)
- iii) Calcium chloride (CaCl_2).

6

- C) 25 ml of 0.2 N HCl is titrated against 0.2 N KOH. Calculate the pH of the titration mixture at following stages

- i) 20 ml KOH added
- ii) 30 ml KOH added

4



5. A) What is glass transition temperature ? Give the factors affecting it. 6
- B) Give synthesis, properties and applications of **any two** :
- i) Polyvinyl chloride
 - ii) Acrylonitrile Butadiene Styrene (ABS) plastic
 - iii) Styrene- Butadiene Rubber (SBR)
 - iv) Silicone Rubber. 6
- C) What are polymer composites ? Give in brief properties and applications of polymer composites. 4

OR

6. A) What is vulcanisation of rubber ? Give structural changes taking place on vulcanisation. State the effects on properties of rubber on vulcanisation. 6
- B) Differentiate between
- i) Addition polymerisation and condensation polymerisation
 - ii) Thermoplastics and thermosetting polymer. 6
- C) Explain the factors which increase thermal stability of polymers with suitable example. 4