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Total No. of Questions : 6] [Total No. of Printed Pages : 3

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F. E. (Semester - I) Examination - 2010

APPLIED SCIENCE - I

(CHEMISTRY)

(2008 Pattern)

Time : 2 Hours] [Max. Marks : 50

Instructions :

(1) Answer 3 questions.

(2) Black figures to the right indicate full marks.

(3) Neat diagrams must be drawn wherever necessary.

(4) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

Q.1) (A) (a) Define Axis of Symmetry for Crystals. Draw diagrams showing two-fold, three-fold and four-fold axes of symmetry for Cubic Crystals. **[04]**

(b) Give difference in Schottky and Frenkel point defects in Ionic Crystals. **[04]**

(B) Derive Bragg's Law Equation for Crystals acting as reflection grating. **[05]**

(C) What is Atomic Packing Factor (APF) for Crystals ? Calculate APF for Closest Packing Cubic Crystal System. **[04]**

OR

Q.2) (A) Give Bravais Lattices for Cubic, Orthorhombic and Hexagonal Crystal Systems. Draw diagrams for Bravais Lattices of Cubic Crystal Systems. **[07]**

(B) What is Luminescence ? Describe structure of ZnS shortly. How is Luminescence of ZnS increased ? Give uses of ZnS as Phosphor. **[05]**

(C) Give structure and properties of Tetrathiofulvalene. How is Tetrathiofulvalene converted to stable charge-transfer compound ? Give uses of such compound. **[05]**

Q.3) (A) (a) Define a Primary Standard. What are the conditions for a chemical to be the Primary Standard ? **[04]**

(b) 50 ml of a Chloride Water Sample requires 5.7 ml of M/100 $AgNO_3$ in Mohr's Method of Precipitation Titration. Find amount of Chloride Ions per litre in the Water. (Ionic Weight of Cl^- = 35.5) **[03]**

(B) Explain weak acid - strong base titration regarding net reaction, titration curve and suitable indicators. Give formula for calculation of pH of titration mixture at the stage of equivalence point. (Assume strong base solution in burette.) **[06]**

(C) Calculate equivalent weight of $KMnO_4$ oxidising reagent in acidic medium. (Atomic Weights : K = 39, Mn = 55, O = 16) **[03]**

OR

Q.4) (A) (a) Show that colour change pH interval of an acid-base titration indicator is about 2 pH-units. **[04]**

(b) Balance **any one** of the following redox reactions by ion-electron or nascent oxygen method : **[03]**

(i) $KMnO_4 + H_2SO_4 + FeSO_4 \rightarrow MnSO_4 + Fe_2(SO_4)_3 + H_2O$

(ii) $Fe^{+2} + Sn^{+4} \rightarrow Fe^{+3} + Sn^{+2}$

(B) 25 ml 0.1N HCl is titrated against 0.075N NaOH from burette. Calculate pH of titration mixture at following stages : **[05]**

(a) 10 ml NaOH added.

(b) 40 ml NaOH added.

(C) Explain role of any two indicators for Precipitation Titrations. **[04]**

Q.5) (A) Give polymerisation reaction, properties and uses of **any two** of the following polymers : **[08]**

(a) S.B.R.

(b) ABS Plastic

(c) Epoxy Resin

(d) Polystyrene

(B) Give a note on compounding of polymers regarding : **[05]**

(a) Plasticizers

(b) Fillers

(c) Stabilizers

(C) Compare Natural Rubber and Vulcanised Natural Rubber. **[04]**

OR

Q.6) (A) (a) Distinguish between LDPE and HDPE. **[04]**

(b) Classify Co-polymers. **[03]**

(B) Write a short note on **any one** of the following : **[05]**

(a) Biodegradable Polymers

(b) Conducting Polymers

(C) Give Free Radical Mechanism of Chain Polymerisation. **[05]**
