[This question paper contains 4 printed pages.]

Sr. No. of Question Paper : 8303 **C** **Roll No.....**

Unique Paper Code : 217161

Name of the Paper : CHPT-101 : CHEMISTRY – I

Name of the Course : B.Sc. Physical Sci./Life Sci./Applied Sci./Part I

Semester : I

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **three** questions from Section-A and Section-B respectivley.

SECTION – A

1. (a) Write down schrodinger wave equation and explain the terms involved in it.

   (b) Explain the significance of wave function and the square of wave function respectively.

   (c) What is Heisenberg's uncertainity principle ?

   (d) Draw the radial distribution curves for 1s, 2s, 3s orbitals. (2,2,4,4½)

2. (a) Define concept of exchange energy.

   (b) Discuss the Born Haber cycle for estimating lattice energy.

   (c) Explain why dipole moment of CO_2 is zero and SO_2 is not.

   (d) O_2 is paramagnetic and N_2 is not. Explain.

   (e) NaCl is soluble in water but AgCl is not. Why ? (2½×5)

P.T.O.

3. (a) Which of the following molecules are planar and why :

BF_3, NH_3 and CH_4

(b) Discuss geometrical shape of the following molecules :

IF_7, PCl_5, SF_4 and ClF_3

(c) Write down the electronic configuration for the elements having atomic numbers 24 & 29.

(d) Discuss the energy of hydration in relation to solubility of ionic compounds. (4½,4,2,2)

4. Write short notes on any **five** of the following :

(i) Fajan's rules

(ii) VSEPR theory

(iii) Lattice energy

(iv) Quantum numbers

(v) M.O. diagram for NO

(vi) Resonance in inorganic compounds (2½×5)

SECTION - B

5. (a) Write a test to distinguish between but-1-yne and but-2-yne ***or*** propene and propyne.

(b) Give the mechanism of the reaction involved in the formation of chloromethane from methane by treatment with chlorine in the presence of light.

(c) Discuss the mechanism of the addition of HBr to propene in the presence of peroxide.

(d) Write the products formed :

(i) when ethene is treated with bromine, followed by treatment with sodamide

(ii) 2-bromobutane is treated with alcoholic KOH, followed by treatment with alkaline $KMnO_4$. (1½,3,4,4)

6. (a) Draw the meso isomer of tartaric acid in Fischer's projection and assign R/S configuration at all the asymmetric carbon atoms, showing the priorities of various groups.

(b) How conformation is different from configuration ? Draw the various conformations of n-butane and discuss their stability.

(c) Which of the following compounds can show geometrical isomerism ? Give reasons : (i) 2,3-Dibromobut-2-enoic acid (ii) 2,3-Dibromopropenoic acid. (5,5,2½)

7. (a) An alkyl halide 'A' (C_4H_9Br) reacts with alcoholic KOH and gives an alkene (B), which reacts with bromine to give dibromide (C). The compound (C) forms a compound (D) on treatment with sodamide, which forms a precipitate when passed through an ammonical $AgNO_3$ solution. Assign structure to compounds A-D and explain the reactions involved.

(b) Write short notes on any **two** of the following :

(i) Reactive intermediates

(ii) Hyperconjugation

(iii) Kolbe's reaction (6½,6)

8. (a) Which of the following will show aromatic character ? Justify your answer on the basis of Huckel's rule : cyclopropene, cyclopentadienyl anion, 1,3,5,7-cyclo-octatetraene.

(b) Discuss the hybridization and geometry of methyl cation.

(c) Explain giving reasons :

(i) Which is more acidic, ethanoic acid and 2-chloroethanoic acid ?

(ii) Which is more basic, methylamine and aniline ?

(d) Write the steps involved in the hydroboration-oxidation of 2-methylpropene.

(4,2½,4,2)