Roll No. ..... Total Pages : 4

BT-I/D-20 **41037**

CHEMISTRY

Paper : BS-101A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all, selecting atleast *one* question from each unit. All questions carry equal marks.

UNIT–I

1. (a) Write the necessary conditions for an organic compound to be aromatic. Explain Benzenoids and Non-Benzenoids. (4)

(b) Describe Band-Theory for solids. Also explain various types of solids on the basis of this theory. (5)

(c) Write down the electronic configuration of N_2^-, N_2 and O_2^{2-} molecules and find out their bond order. (6)

2. (a) Write the salient features of crystal field theory. Describe the energy level diagram and magnetic behaviour of

$[PtCl_2(NH_3)_2]$ on basis of CFT. (7)

(b) Describe the characteristics of Molecular orbitals. Explain the molecular orbitals energy level diagram for CO^+ and find out its bond order. (8)

UNIT–II

3. (a) Explain the different types of transitions feasible in UV-visible spectroscopy. Also explain the formation of K-band, R-band. (7)

(b) Define the term spectroscopy. Differentiate absorption spectroscopy and Emission spectroscopy. (4)

(c) Write a note on "Scattering of Light". (4)

4. (a) Write a note on MRI. (4)

(b) Name the compound used as a reference compound in NMR and why has this compound selected as a reference. (4)

(c) What is the basic principle of IR spectroscopy. Explain different stretching and bending vibrations occurring in IR spectroscopy for a triatomic molecule. (7)

UNIT–III

5. (a) Derive Nernst equation for an electrode concentration cell and give its significance. (6)

(b) Define following terms :

(i) Electrode potential.

(ii) Heat capacity.

(iii) Reversible process.

(iv) Adiabatic process. (4)

(c) Derive an equation for entropy change for an ideal gas, if pressure and temperature are variables. (5)

6. (a) Define the terms-Polarisation and Polarising power. Describe Fajan's rule. (6)

(b) Give basic postulates of VSEPR theory. Explain the following using this theory.

(i) Bond angles order for

$PF_3 < PBr_3 < PI_3$ and $H_2O > H_2S > H_2Se$. (6)

(c) Define terms Electron Affinity and Electronegativity. (3)

UNIT–IV

7. (a) Define elimination reaction. Differentiate E_1 and E_2 mechanism with example. (6)

(b) Write product for following reaction :

$$CH_3 - CH = CH_2 + HBr \xrightarrow[\text{Peroxide}]{\text{Benzoyl}} ?$$

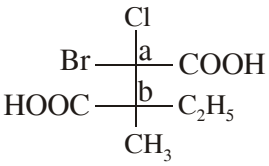
Name this reaction and also write mechanism. (5)

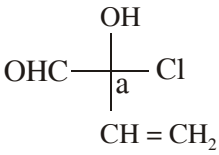
(c) Explain S_N2 mechanism. (4)

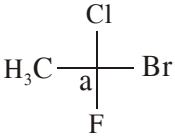
8. (a) Write down CIP rules used while assigning absolute configuration to organic molecules. (4)

(b) Assign absolute configuration R/S to the following. (4)

(i)



(ii) 

(iii) 

(c) Define the term optical activity. (2)

(d) Differentiate Enantiomers and diasteromers with proper examples. (5)