Roll No. ..... **Total Pages : 03**

BT-I/D-21 **41037**

CHEMISTRY

BS-101A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Write down the characteristics of Molecular Orbitals. Explain the *p*-molecular orbitals and the filling of valence electrons in Butadiene. **8**

(b) Define Doping in solids. Explain *n*-type and *p*-type semiconductors. **7**

2. (a) Differentiate the geometry of Tetrahedral and Octahedral co-ordination complexes on the basis of Crystal Field Theory using proper examples. **11**

(b) Define Aromatic Compounds. Describe their types with example. **4**

Unit II

3. (a) Explain the terms Fluorescence and Phosphorescence using Jablonski diagram. Also write the application of Fluorescence. **10**

(b) Define the term Electromagnetic Radiations. Explain the various types of radiations (Portions of Electromagnetic spectrum) used in different spectroscopic techniques. **5**

4. Write notes on the following spectroscopic techniques :

(i) NMR **7½**

(ii) Infra-red spectroscopy. **7½**

Unit III

5. (a) Define Free Energy. Give the physical signifance of Helmholtz free energy and Gibbs' free energy. **6**

(b) Define the term Entropy. Give its significance. Justify that $\Delta S_{total} = 0$ (for reversible process) and $\Delta S_{total} > 0$ (for irreversible process). **6**

(c) Define Electrolytic cell and Electrochemical. **3**

6. (a) How would you explain the large atomic radii of noble gases ? Explain the order of radius among I, I^- and I^+. **4**

(b) Define the term Ionisation Energy. Explain why the first ionisation energy of C atom is greater than Boron atom whereas reverse is true for 2nd Ionisation energy ? **5**

(c) Write a note on Hard-soft/Acid-base concept. **6**

Unit IV

7. (a) Describe the reaction, mechanism for synthesis of Aspirin. Also write the use of this drug. **6**

(b) Give the mechanism of nitration of Toluene. **4**

(c) Explain Cyclisation reaction and Ring opening reactions in Organic Chemistry with suitable examples. **5**

8. (a) Define the term Isomer. Write different types of Isomers. Explain the various forms of structural isomers with examples. **8**

(b) What are conformational isomers ? Explain the various conformations feasible for *n*-Butane. **4**

(c) Write different methods of resolution of a mixture of enantiomers. Which method is the best one ? **3**