

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**

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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 significance of Helmholtz free energy and Gibbs' free energy. **6**
- (b) Define the term Entropy. Give its significance. Justify that $\Delta S_{\text{total}} = 0$ (for reversible process) and $\Delta S_{\text{total}} > 0$ (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**

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- (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