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

BT-2/M-24 42034

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) What is the meaning of low spin and high spin complexes ? Explain the splitting of d-orbitals for Tetrahedral complexes, citing an example, on the basis of Crystal field theory.

(b) Explain the magnetic behavior of $[Fe(NH_3)_6]^{3+}$ with the energy level diagram on the basis of Crystal Field Theory. **9+6**

2. (a) Explain the Linear Combination of Atomic Orbitals for the formation of molecular orbitals. Also compare the stability of O_2^+, O_2^- and O_2 using Molecular Orbital energy level diagram.

(b) Define Aromaticity in Organic compounds. Explain different types of aromatic compounds with example.

(c) Define doping in semiconductors. Differentiate between p-type and n-type semiconductors. **7+3+5**

Unit II

3. (a) Distinguish between Absorption and Emission spectroscopy. Define the terms- Chromophore, scissoring vibration, asymmetrical stretching and hypsochromic and hyperchromic shift with example wherever possible.

   (b) Describe the scattering of light and give its significance. **10+5**

4. Write notes on the following :

   (a) Electronic transitions in UV-Visible spectroscopy

   (b) Principle of MRI and its applications

   (c) Principle of IR spectroscopy and possible vibrational tranisitions in a molecule. **5×3**

Unit III

5. (a) Define Electrochemical cell. Also differentiate between chemical cell and concentration cell with suitable examples.

   (b) Derive Nernest Equation and describe its applications.

   (c) Find out entropy change for 5 moles of an ideal gas at 25 °C when its volume changes from 5 dm^3 to 10 dm^3. **7+4+4**

6. Describe the following periodic properties in detail :

   (a) Electron affinity

   (b) Ionization energy

   (c) Electronegativity **5×3**

Unit IV

7. (a) Describe the mechanism of electrophilic and free radical substitution reaction with the help of suitable examples.

   (b) Explain the properties, method of preparation and mechanism of preparation of Paracetamol. 8+7

8. (a) Define the term Isomerism. Differentiate between structural and stereo isomers. Explain different types of structural isomers with examples.

   (b) Explain the Cahn, Ingold and Prelog generalizations used for assigning priorities to different groups attached to chiral centre.

   (c) Explain cyclization reaction for organic compounds with examples. 8+4+3