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BT–1/D-23 **41037**

CHEMISTRY

Paper–BS–101A

Time Allowed : 3 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) Explain the Crystal Field Theory for octahedral and square planer complexes. Define the Crystal Field splitting energy and Crystal field stabilitzation energy. Explain the magentic behavior of an octahedral complex taking suitable example on the basis of CFT using energy level didagram. 10

   (b) Expalin the pi-molecular orbitals and the electronic distribution among them for Buta-1, 3-diene. 5

2. (a) Defien the Aromaticity of Organic compounds. Describe different types of Aromatic compounds with example. 5

   (b) Define doping in semiconductors. Also describe various types of semiconductors. What is the effect of doping on their band structures? 5

(c) Compare the bond length in N_2, N_2^+ and N_2^- on the basis of molecular orbital energy level diagram. 5

UNIT–II

3. (a) Define electromagnetic radiations. Mention the different regions of electromagnetic spectrum used in various spectroscopy techniques. 5

(b) Differentiate between Fluorescence and phosphorescence with the help of Jablonski diagram. 5

(c) Explain various stretching and bending vibration involved in IR spectroscopy. 5

4. Write notes on the following :

(a) UV-visible spectroscopy. 5

(b) Nuclear Magnetic resonance Spectroscopy. 5

(c) MRI. 5

UNIT–III

5. (a) Derive Nernst equation and give its applications. 3

(b) Define the term entropy and give its unit. What is its significance? Find out the entropy change for an ideal gas. 6

(c) Write basic aspects of VSEPR theory. Also explain bond angle in NH_3 and NF_3 on basis of VSEPR theory. 6

6. (a) Write a note on Hard/Soft acid and base concept. Also give its significance. 5

(b) Define the terms- electron affinity, Ionization energy and Electronegativity. Also explain the significance of electronegativity and various factors effecting these periodic properties. 10

UNIT–IV

7. Differentiate between (with proper examples) :

(a) E1 and E2 elimination mechanism. 5

(b) S_N1 and S_N2 mechanism of substitution reaction. 5

(c) Electrophillic substitution and Free radical substitution. 5

8. (a) Define Isomerism. Explain different types of optical isomers with suitable examples. Explain CIP rules for assigning absolute configuration to organic compounds. 10

(b) Differentiate ring opening and cyclisation process in organic compounds with suitable 5