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BT-1/D-18 **31037**

CHEMISTRY

Paper : BS–101A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt any *five* questions, selecting at least *one* question from each unit. All questions carry equal marks.

UNIT–I

1. (a) Draw the molecular orbital energy level diagram for CO and N_2 molecules. Also find out the bond order in each case. 10

(b) Define orbital and differentiate between σ and π molecular orbitals. 5

2. (a) What is crystal field stabilization energy. How is it calculated in tetrahedral, octahedral and square planar fields of ligands. 6

(b) Write spectrochemical series and explain its importance. 3

(c) What do you mean by aromaticity. Explain Huckel rule of aromaticity with examples. 6

UNIT–II

3. (a) What is absorption spectra ? Explain the following in respect of UV–visible spectroscopy.

Bathochromic shift, Hyperchromic shift

Hypsochromic shift, Hypochromic shift. (2+8)

(b) Explain stretching and bending vibrations with respect to IR spectroscopy. 5

4. (a) On what principle NMR spectroscopy is based ? What type of nuclei show NMR spectra. Explain. 5

(b) Explain chemical shift, shielding and deshielding in NMR spectroscopy. 3

(c) Write a short note on MRI. 4

(d) What are selection rules in spectroscopy? 3

UNIT–III

5. (a) Explain the terms internal energy and enthalphy in thermodynamics. (2+2)

(b) What is the physical significance of entropy? 3

(c) Explain the term polarization, polarizability and polarising power. What is the significance of polarization? 5

(d) Write a short note on hard and soft acids. 3

6. (a) Explain the following periodic properties in detail.

(i) Ionization energy.

(ii) Electro negativity. (5+5)

(b) What is meant by effective nuclear charge. Write Slater rules for finding out effective nuclear charge. 5

UNIT–IV

7. What is isomerism ? Explain all.

(a) The different types of structural isomers with example in each case. 10

(b) What is drug ? How is aspirin synthesised ? What is the use of aspirin ? 5

8. Write short notes on the following :

(a) Elimination reactions.

(b) Enantiomerism.

(c) CIP rules for writing absolute configuration. (5×3=15)