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Total No. of Pages : 03

Total No. of Questions : 09

**B.Tech. (AE/AI&ML/AI&DS/DS/AR/AE/CE/CSE/IOT/EEE/EE/ECE/
FT/IT/ME/ Robotics & AI/Internet of Things and Cyber Security including
Block Chain Technology) (Sem-1,2)**

CHEMISTRY-I

Subject Code : BTCH-101-18

M.Code : 75343

Date of Examination : 12-06-2023

Time : 3 Hrs.

Max. Marks : 60

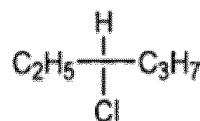
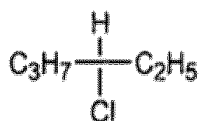
INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C. have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

1. Answer briefly :

- a) Enlist the important features of crystal field theory.
- b) Why ionisation energy of Nitrogen is higher than that of Oxygen?
- c) Assign R/S configuration to the following :



- d) Discuss Diel-Alder Reaction.
- e) Calculate the number of signals for the following compounds:
 - i) $\text{CH}_3\text{-CH}_2\text{-O-CH}_3$
 - ii) $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-OH}$.
- f) Name the various types of intermolecular forces with an example of each.

- g) What type of molecules show IR Spectra?
- h) How free energy decides the spontaneity of a process?
- i) Which out of the conjugated dienes or non-conjugated dienes are more stable and Why?
- j) Differentiate between dry and wet corrosion.

SECTION-B

- 2.
 - a) Discuss the Schrodinger wave equation for particle in one dimensional box and relate important results from it.
 - b) Differentiate between Bonding and Antibonding molecular orbital.
- 3.
 - a) Explain Crystal field splitting in octahedral complexes.
 - b) What is role of doping on Band structures?
- 4.
 - a) Give important applications of UV-visible spectroscopy with proper examples.
 - b) Explain chemical shift in NMR.
 - c) Differentiate between Scattering and Diffraction.
- 5.
 - a) How and why do real gases deviate from ideality?
 - b) What do you mean by critical phenomenon in gases? How are critical constants related to vander Waal's constants?

SECTION-C

- 6.
 - a) Derive Nernst Equation for the calculation of cell E.M.F.
 - b) Using Ellingham Diagram to explain carbon monoxide is a suitable reducing agent for oxide ore.

7. **Write short notes on the following :**
- a) Polarizability
 - b) Penetration of molecular orbitals
 - c) Atomic radius
 - d) Co-ordination number.
8. a) Draw all the stereoisomers of 3-chloro-2-pentanol
- $$\text{CH}_3\text{CH}(\text{OH})\text{CHClCH}_2\text{CH}_3$$
- b) Give conditions for a compound to show enantiomerism.
 - c) Define linkage Isomerism.
9. a) Compare SN_1 and SN_2 substitution reactions.
- b) **Write short notes on the following organic reactions :**
- i) Oxidation Reactions
 - ii) Ring Opening Reactions

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.