

Roll No.

Total No. of Pages : 02

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**B.Tech. (AE/AI & ML/DS/CE/CSE/EE/ECE/FT/IT/ME/Robotics & Artificial Intelligence/ 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 : 14-05-2024**

**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) Give difference between bonding and anti-bonding molecular orbitals.
- b) How many kinds of protons are present in following compounds :
  - i)  $\text{CH}_3\text{-CH}_2\text{-OH}$
  - ii)  $\text{CH}_3\text{-CH}_2\text{-O-CH}_2\text{-CH}_3$
- c) Distinguish between real gas and ideal gas.
- d) Define Free energy and internal energy.
- e) What type of molecules shows IR spectra?
- f) What is electronegativity? Which element has highest electronegativity?
- g) What is difference between configuration and conformation?
- h) What is  $\text{SN}^1$  Substitution? Explain.
- i) What is bond order? Calculate the bond order of  $\text{N}_2$  molecule.
- j) What is Magnetic Resonance Technique?

## SECTION-B

2.
  - a) Derive Schrodinger wave equation for particle in one dimensional box.
  - b) Explain delocalisation of pi ( $\pi$ ) orbitals by taking the example of 1, 3-butadiene.
3.
  - a) Discuss the principle of U.V visible spectroscopy.
  - b) Differentiate between bathochromic and hypsochromic shift.
  - c) What is the importance of fingerprinting in IR Spectroscopy?
4.
  - a) Derive Van der Waal's equation of state for n moles of gas.
  - b) What do you know about potential energy surface? Discuss its applications.
5.
  - a) What is Nernst Equation? Derive it.
  - b) Using Ellingham diagram to explain carbon monoxide is a suitable reducing agent for oxide ore.

## SECTION-C

6.
  - a) Discuss the molecular geometries of following compounds :
    - i)  $\text{NH}_3$
    - ii)  $\text{H}_2\text{O}$ .
  - b) What is Atomic Size? Name the factors on which atomic size depends.
7.
  - a) Describe the Structural isomerism in transition metal complexes.
  - b) Describe the concept of Diastereomerism by taking examples.
8.
  - a) Discuss the synthesis of drug molecule Aspirin.
  - b) Differentiate between  $\text{SN}^1$  and  $\text{SN}^2$  Reactions.
9.
  - a) Describe the crystal field splitting in tetrahedral complexes.
  - b) Discuss the role of doping on band structures.

**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.**