**Roll No.** | | | | | | | | | | | | **Total No. of Pages : 03**

**Total No. of Questions : 09**

**B.Tech. (AI & ML / AI & DS / AE / CE / CSE / DS / IOT / EE / ECE / IT / ME / 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 : 20-12-2024**

**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

**l. Write short notes on:**

a) What are the criteria for the molecule to be aromatic?

b) What is role of doping on band structure?

c) What is magnetic resonance imaging(MRI)?

d) What is dry corrosion?

e) Differentiate between ion dipole and dipole-dipole interaction.

f) What is cell potential?

g) What are the differences between diastereoisomer and enantiomer?

h) What are possible geometries for a metal complex with four coordination, number?

i) What is polarizability?

j) What is Chirality? Explain with examples.

## SECTION-B

2. a) Derive the Schrodinger wave equation for a particle in one dimension box.

   b) Draw the molecular orbital diagram of NO molecule.

3. a) Discuss the crystal field splitting in octahedral complexes.

   b) What is the principle of electronic spectroscopy?

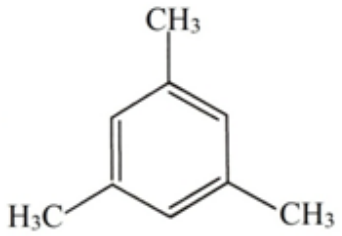
4. a) What is Entropy?

   b) What is Ellingham diagram? How can it be constructed? Discuss its important characteristics.

5. a) How many signals are present in following compounds in PROTON NMR SPECTROSCOPY?

   1. $CH_3$-$NH_2$

   2. $CH_3$-$CH_2$-O-$CH_3$

   3. 


   4. $CH_3$-$CH_2$-$CH_2$-OH

   b) Explain the mechanism of fluorescence and phosphorescence by Jablonski diagram.

## SECTION-C

6. a) What is electrochemical corrosion? Discuss its various types.

   b) Calculate the equilibrium constant for the reaction.

   $Sn^{2+}$ (aq) + Pb(s) $\rightleftharpoons$ Sn(s) + $Pb^{2+}$ (aq)

   At 298K given E° ($Sn^{2+}$/Sn) = - 0.14V and E° ($Pb^{2+}$/Pb) = -0.13 V

7. a) Discuss the structure of $BCI^3$ and $NH^3$ according to VSEPR theory.

   b) Why ionisation energy of nitrogen is more than oxygen?

   c) Explain why electron affinities of halogens are high?

8. Discuss the potential energy surface diagram of $H_3$.

9. a) What are addition reaction? Explain with examples.

   b) Discuss the various possible isomerisation in transitional metal complexes.

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