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

Total No. of Questions : 09

B.Tech. (AI & DS / AI & ML / Block chain / CE / CSE / DS / CSD / FT / CSE / EE / ECE / EEE / IT / ME / Robotics & Artificial Intelligence/Internet of Things and Cyber Security including Block Chain Technology) (Sem.–1, 2)

CHEMISTRY-I

Subject Code : BTCH101/23

M.Code : 93800

Date of Examination : 11-06-2024

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 is Huckel's rule, and how does it predict aromaticity in cyclic hydrocarbons?

(b) How can you explain the effect of doping on the band structure of semiconductors?

(c) How many 'H NMR signal will be obtained in:

(i) CH_3-CHCI-CH_3 (ii) CH_2CI-$CHCI_2$?

(d) What is Fluorescence? Explain with the help of Jablonskii diagram.

(e) What are different types of Van der Waal's forces?

(f) Differentiate between Real gases and Ideal gases.

(g) Distinguish between hard water and soft water.

(h) How would you explain the fact that first ionization enthalpy of sodium is lower than that of magnesium but its second ionization enthalpy is higher than that of magnesium?

(i) What is enantiomerism? Explain with an example.

(j) What is Markownikov's addition?

SECTION-B

2. (a) Give the molecular orbital energy level diagram of O_2 and N_2. Comment on the bond order and magnetic characteristics of these molecules.

(b) Define wave function and give its significance.

3. (a) Explain the crystal field splitting of orbitals in octahedral and tetrahedral fields in complexes.

(b) Calculate the emf of the cell Zn/ Zn^{2+} (0.001M) || Cu^{2+} (0.1M)/ Cu. The standard potential of Cu/Cu^{2+} half-cell is +0.34 V and Zn/Zn^{2+} is 0.76 V.

4. (a) What are the different factors which affect the value of λ_{max} and intensity of spectral lines?

(b) What are chromophores and auxochromes? Explain with suitable examples.

5. (a) Derive relation between Van der Waals constants and critical constants,

(b) Explain Boyle's law and Charle's Law.

SECTION-C

6. (a) Compare the hot lime soda process and the zeolite process of water softening with respect to the principles involved, advantages and limitations.

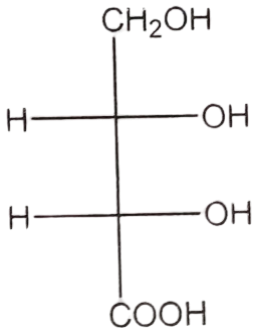
(b) Derive the Nernst equation for the calculation of cell e.m.f.

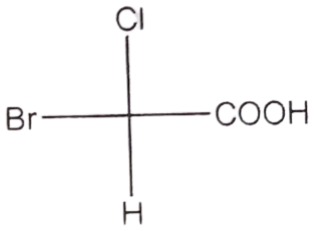
7. (a) Define the term electronegativity. How does it vary in the periodic table?

(b) Ionization enthalpy decreases in a group from top to bottom. Why?

(c) Electron gain enthalpies of noble gases are positive. Why?

8. (a) Assign R or S configuration of each of the following compounds:





(b) Give the conformational analysis of ethane with potential energy diagram for various suitable conformations of it.

9. (a) Differentiate between S_N1 and S_N2 reactions.

(b) Give the mechanism of the following reaction:

$$CH_4 + 4Cl_2 \xrightarrow{h\nu} CCl_4 + 4HCl$$

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.