B.Tech Even Semester Examination, May, 2025

Computer Science & Engineering

(2nd Semester)

Course No: ASHC-151/ASH-201

(Chemistry-I)

Full Marks: 70

Pass Marks: 28

Time: 3 hours

Note:

1. Attempt any five questions taking one from each unit.
2. Begin each answer in a new page
3. Answer parts of a question at a place
4. Assume reasonable data wherever required
5. The figure in the right margin indicates full marks for the question
6. All the mathematical symbols and abbreviations have their usual meanings.

UNIT-I

1. Derive the Schrodinger wave equation. Find the energy of particle moving in 1D box. 7+7

2. Discuss crystal field theory with suitable illustrative diagram. Find the crystal field stabilization energy and magnetic properties of d^4 and d^7 for both strong and weak field ligands. 7+7

UNIT-II

3. What is chemical shift? Find the H^1 NMR signals of CH_3CH_2Br and Cl_2CHCH_2Cl. Discuss on magnetic resonance imaging (MRI). 2+5+7

4. Diagrammatically illustrate the Jablonski diagram. Write the applications of fluorescence in medicine. 7+7

Turn Over

UNIT-III

5. What are critical constant of a gas? Discuss the PV isotherm of CO_2 molecule. Draw the potential energy diagram of H_2 + F. 3+4+7

6. What is Gibbs free energy? Derive the change in Gibbs free energy of an ideal gas. Write the Nernst equation for Zn^{2+} (aq)/Zn (s) and Fe^{3+} (aq)/Fe^{2+} (aq). Solubility product of Ag_2CrO_4 is 9.0×10^{-12} at 298 K. Calculate the solubility of Ag_2CrO_4. 2+5+3+4

UNIT-IV

7. What are the factors that favour polarization and covalency as proposed by Fajans? Discuss the HSAB principle with suitable examples. 6+8

8. Explain ionization energies, electron affinity, electronegativity, and oxidation states of atom based on the periodic table. 4+4+4+2

UNIT-V

9. Discuss SN1 and SN2 reaction of organic molecules. Discuss E1 and E2 reaction of organic molecules. 7+7

10. Discuss the different types of isomerism of organic compounds. 14

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