

2025

BIOTECHNOLOGY / MICROBIOLOGY

Paper: CHE0100104-N

(CHEMISTRY I)

Full Marks – 45

Time: 2 hours

The figures in the margin indicate full marks for the questions.

1. Answer the following questions: 1×5=5
- (a) What is electron affinity.
 - (b) What is effective nuclear charge?
 - (c) Write the Hund's rule of maximum multiplicity.
 - (d) What is viscosity coefficient? Explain it.
 - (e) What is compressibility factor?
2. Answer the following questions (*any five*): 2×5= 10
- (a) Write about electrophile and nucleophile. Give examples.
 - (b) Write the postulates of Bohr's theory.
 - (c) What is geometrical isomerism? Give examples?
 - (d) What is inductive effect. Explain it.
 - (e) What is the significance of ψ^2 .
 - (f) Write the Fischer and Sawhorse projection formulae of ethane molecule.
 - (g) Write about the characteristics of ionic compounds.
 - (h) Write Kapustinskii equation?
 - (i) What do you mean by chiral carbon? Give one example of it.
 - (j) Write down the Pauli's exclusion principle.

(Turn Over)

3. Answer the following questions (*any four*):

5×4=20

- (i) What do you mean by lattice energy? Write about Born Haber cycle for lattice energy calculation.
- (ii) What is photoelectric effect? Explain it with the help of diagram. What is threshold frequency? Give mathematical expression of it.
- (iii) What is Heisenberg's uncertainty principle? Show dual nature of particle with the help of an equation.
- (iv) What do you mean by hybridisation? Show the hybridisation of carbon in methane and ethane molecule.
- (v) Write about the different conformers of cyclohexane and compare their stability.
- (vi) Write about micelle formation and critical micelle concentration. Explain with diagram.
- (vii) Show the relation of critical constants and van der Waals constants.
- (viii) What is electronegativity? Write and explain about any two scales of electronegativity.

4. Answer the following questions (*any one*):

10×1=10

- (i) Draw the Molecular Orbital diagram of oxygen molecule. With the help of it determine the bond order of oxygen molecule. Write about different types of covalent bond.
- (ii) What is quantum number. Write about the different types of quantum numbers and explain with examples. With the help of example show that no two electrons in an atom have the same set of four quantum numbers.
- (iii) What do you mean by surface tension? Write the unit of it. What is the effect of temperature on surface tension? Explain one method to determine surface tension.
- (iv) Derive Van der Waals equation. Write about pressure-volume isotherm, draw and explain it with the help of example.