

This question paper contains 2 printed pages]

VA—11—2024

FACULTY OF SCIENCE

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

CHEMISTRY

Paper—XIII

(Physical and Inorganic Chemistry)

(Monday, 2-12-2024)

Time : 10.00 a.m. to 12.00 noon

Time—2 Hours

Maximum Marks—40

N.B. :- (i) Attempt *all* questions.

(ii) Figures to the right indicate full marks.

(iii) Use of logarithmic table and non-functional calculator is allowed.

1. Answer any *three* of the following : 3×5=15

(a) Explain the anions and isopoly acids of M_O^{6+} ions.

(b) Discuss polymerisation of W_6^{+} cation.

(c) Explain 1 : 12 (Tetrahedral heteroatom) polyanions with suitable examples.

(d) Explain the structure of $Os(CO)_4$ and CH_2 fragment.

(e) Explain $C_0(CO)_4$ organometallic fragment is isolobal with CH_3 fragment and Cl-atom.

P.T.O.

2. Answer any *three* of the following : 3×5=15

- (a) Derive the relation between total vapour pressure and mole fraction of the component in vapour phase.
- (b) Derive an expression for Gibbs free energy change of mixing (ΔG_{mix}) for an ideal solution. Show that for an ideal solution $\Delta H_{\text{mix}} = 0$.
- (c) Define diamagnetic substances. Give its examples. Discuss characteristics of diamagnetic substances.
- (d) Derive an expression for Ilkovic equation.
- (e) Discuss the application of polarography in the estimation of inorganic and organic substances.

3. Answer any *two* of the following : 2×5=10

- (a) Explain the construction and working of dropping mercury electrode (DME).
- (b) Discuss the experimental measurement of magnetic susceptibility.
- (c) Derive Gibbs-Duhem-Murgules equation and applied it for ideal solution.
- (d) Derive an expression for chemical potential in ideal and non-ideal solution.