VA—01—2024

FACULTY OF SCIENCE

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

NOVEMBER/DECEMBER, 2024

(CBCS/New Pattern)

CHEMISTRY

Paper–XIV

(Organic and Inorganic Chemistry)

(Tuesday, 26-11-2024)   **Time : 10.00 a.m. to 12.00 noon**

Time—2 Hours   *Maximum Marks—40*

N.B. :— (*i*)   *All* questions are compulsory.

(*ii*)   Figures to the right indicate full marks.

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

(*a*)   What are the limitations of valence bond theory ?

(*b*)   Explain the following factors affecting the magnitude of crystal field splitting :

(*i*)   Nature of ligand

(*ii*)   Size of *d*-orbital.

(*c*)   Explain spilitting of *d*-orbitals in octaheadral complexes.

P.T.O.

(d) Calculate the spectroscopic ground state term symbol for d^3 and d^5 configuration.

(e) Write different types of electronic transition involved in metal complex.

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

(a) Define and explain :

(i) Chromophore

(ii) Auxochrome.

(b) Explain shielding and deshielding effect with suitable example.

(c) Define copolymer. Explain free radical addition polymerization reaction with mechanism.

(d) Explain Steven's rearrangement with mechanism.

(e) An organic compound with molecular formula C_2H_7N gave the following spectral data :

UV : Transparent above λ_{max} 210 nm

IR : 3530, 2975 cm^{-1}

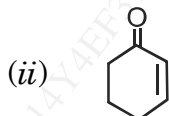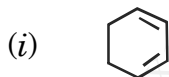PMR (SPPM) : $\delta 1.0$ (t, 3H, J = 6 Hz)

: δ 2.5 (9, 2H, J = 6 Hz)

: δ 2.0 (5, 2H)

Deduce the structure of compound.

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

(*a*) Define Scissoring and Rocking vibrations. Calculate λ_{max} of :

(*i*)

(*ii*)

(*b*) Give the advantages of TM_5.

(*c*) Give synthesis and uses of :

(*i*) Nylon 6, 10

(*ii*) Polyurethanes

(*d*) Deduce the structure of compound based on the following PMR spectral data :

Molecular formula : C_8H_8O

PMR (δ_{ppm}) : δ 2.33 (5, 3H)

δ 7.1 (m, 5H)