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PA—01—2024

FACULTY OF SCIENCE

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

APRIL/MAY, 2024

(New/CBCS Pattern)

CHEMISTRY

Paper XIV(A_1)

(Organic and Inorganic Chemistry)

(Tuesday, 2-4-2024) **Time : 10.00 a.m. to 12.00 noon**

Time—Two 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 inner orbital complex ? Explain with suitable example.

(*b*) Define CFSE. Calculate CFSE of d^4 and d^8 configuration in weak ligand field octahedral complex.

(*c*) Explain the effect of size of metal ion geometry of complex on magnitude of crystal field spliting.

(*d*) What is d-d transition ? Write its selection rule.

(*e*) Discuss electronic spectrum of $[Ti(H_2O)_6]^{3+}$ complex.

P.T.O.

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

(*a*) Interpret IR spectrum of the following compounds :

(*i*) Ethyne

(*ii*) *t*-butyl alcohol

(*iii*) Acetophenone.

(*b*) Define spin-spin splitting. Predict the number of NMR signal of :

(*i*) Methanol

(*ii*) Ethylamine

(*iii*) Diethyl ether.

(*c*) Define copolymer. Explain anionic polymerization with mechanism.

(*d*) Explain photofries rearrangement reaction with mechanism.

(*e*) The organic compound having molecular formula $C_4H_{10}O$ shows the following spectral data :

UV : Transparent λ_{max} = 210 nm

IR : 3600 – 3200 cm^{-1}

2950 cm^{-1}

1150 cm^{-1}

PMR : (δ ppm)

δ 1.5, s, 9H

δ 4.5, s, 1H

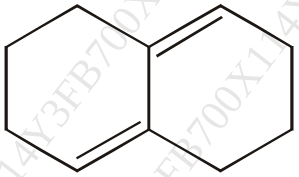
Deduce the structure of compound.

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

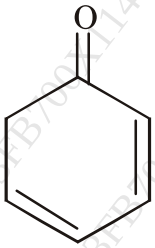
(*a*) Define bathochromic and hypsochromic effect and calculate λ_{max} of :

(*i*)

(*ii*)



(*iii*)



(*b*) Define chemical shift. Write the advantages of TMS.

(*c*) Give the synthesis and uses of neoprene.

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

Molecular formula — $C_4H_8O_2$

PMR (δ ppm) :

δ 0.9, t, 3H

δ 2.1, q, 2H

δ 3.9, s, 3H.