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NA—01—2023

FACULTY OF SCIENCE

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

NOVEMBER/DECEMBER, 2023

(New/CBCS Pattern)

CHEMISTRY

Paper-XIV

(Organic and Inorganic Chemistry)

(Wedday, 29-11-2023) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (1) *All* questions are compulsory.

(2) Figures to the right indicate full marks.

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

(*a*) Write the postulates of crystal field theory.

(*b*) Define crystal field spliting. Calculate CFSE of d^3 and d^6 configuration in strong ligand field octahedral complex.

(*c*) Explain John-Teller distortion effect in octahedral complex of Cu^{2+} ion.

(*d*) Write a note on spectrochemical series.

(*e*) Calculate ground state term symbol of d^3 configuration.

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

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

(*i*) Ethane

(*ii*) 1-propanol

(*iii*) Phenol.

P.T.O.

(*b*) Explain equivalent proton with example and predict number of NMR signal of :

(*i*) Acetone

(*ii*) Ethylamine

(*iii*) Diethylether.

(*c*) Define polymer. Explain free radical polymerization with mechanism.

(*d*) Explain pinacol-pinacolone rearrangement reaction with mechanism.

(*e*) The organic compound having molecular formula C_3H_8O shows the following spectral data :

UV : Transparent λ_{max} = 215 nm

IR : 3600 – 3200 cm^{-1}

2950 cm^{-1}

1050 cm^{-1}

^1H–NMR : (δ ppm)

δ 1.3, t, 3H

δ 2.5,sextet, 2H

δ 3.5, t, 2H

δ 4.3, s, 1H

Deduce the structure of compound :

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

(*a*) Explain different types of electronic transition.

(*b*) Explain shielding effect with a suitable example.

(*c*) Give the synthesis and uses of Nylon-6, 10.

(*d*) Deduce the structure of compound based on the following PMR spectral data molecular formula : C_7H_8

PMR (δ ppm) : δ 2.7, S, 3H

δ 7.2–7.8, S, 5H