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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 splitting. 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 $\lambda_{max} = 215 \text{ nm}$

IR : $3600 - 3200 \text{ cm}^{-1}$

2950 cm^{-1}

1050 cm^{-1}

$^1\text{H-NMR}$: (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.

WT

(3)

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- (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

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