

This question paper contains 3 printed pages]

**GA—01—2023**

**FACULTY OF SCIENCE**

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

**APRIL/MAY, 2023**

**(New/CBCS Course)**

**CHEMISTRY**

**Paper—XIV (A1)**

**(Organic and Inorganic Chemistry)**

**(Tuesday, 18-4-2023)**

**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) Write the postulate of valence bond theory.
  - (b) Explain crystal field splitting of *d*-orbital in octahedral complex.
  - (c) Explain the effect of nature of Ligand, oxidation state of metal ion on magnitude of crystal field splitting.
  - (d) Write different type of electronic transition involved in metal complex.
  - (e) Draw Orgel energy level diagram for  $d^1$  and  $d^9$  system.
  
2. Answer any *three* of the following : 3×5=15
  - (a) Interpret IR spectrum of the following compounds :
    - (i) Ethene
    - (ii) 2-propanol
    - (iii) Acetone.

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GA—01—2023

- (b) Explain non-equivalent proton with example and predict number of NMR signal of :
- (i) Cyclobutane
  - (ii) Ethylbenzene
  - (iii) Mesitylene.
- (c) Define homopolymer. Explain cationic polymerization with mechanism.
- (d) Explain Favorskii 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 :  $3600 - 3200 \text{ cm}^{-1}$

$2950 \text{ cm}^{-1}$

$1100 \text{ cm}^{-1}$

$^1\text{H-NMR}$  : ( $\delta$  ppm)

$\delta 1.4, d, 6\text{H}$

$\delta 3.5, \text{septet}, 1\text{H}$

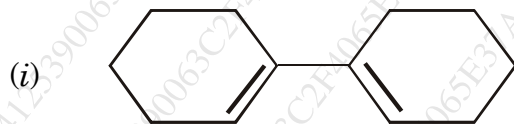
$\delta 4.6, S, 1\text{H}$

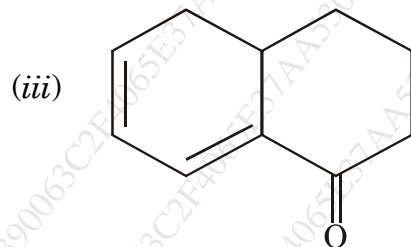
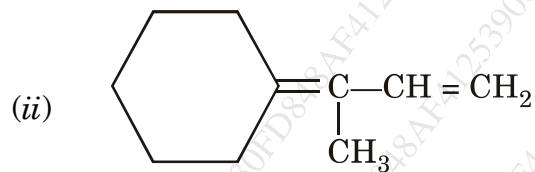
Deduce the structure of compound.

3. Answer any *two* of the following :

$2 \times 5 = 10$

- (a) Define Chromophore and Auxochrome. Calculate  $\lambda_{\max}$  of :





- (b) Explain deshielding effect with suitable example.
- (c) Give the synthesis and uses of polyurethane.
- (d) Deduce the structure of compound based on the following PMR spectral data. Molecular formula :  $C_2H_4O$

PMR ( $\delta$  ppm) :

$\delta$  2.1, s, 3H

$\delta$  9.8, q, 1H.