

Total Pages : 5

Roll. No. :

Examination Session June-2022

(Fourth Semester)

MCH-608

M.Sc. CHEMISTRY (MSCCH)

[Heterocyclic Compounds and Spectroscopy III]

Time : 2 Hours]

[Max. Marks : 40

Note : This paper is of Forty (40) marks divided into two (02) Section A and B. Attempt the questions contained in these sections according to the detailed instructions given therein.

SECTION—A

(Long-Answer-Type Questions)

Note : Section 'A' contains five (05) long-answer-type questions of Ten (10) marks each. Learners are required to answer any two (02) questions only. $2 \times 10 = 20$

- Outline two general methods of synthesis of 1, 2, 4 oxadiazoles from nitriles.
 - What are the products in the following reactions ?
 - 3-methyl-1, 2, 4-oxadiazole $\begin{matrix} \text{(i) HgCl}_2 \\ \text{(ii) I}_2 \text{ in aq. KI} \end{matrix}$
 - 3-phenyl-5-chloro 1, 2, 4-oxadiazole NaOMe
- Write a short note on :
 - Sydnones
 - Dimroth rearrangement
 - Diels-Alder reaction
 - Robinson-Gabiriel synthesis

- Write detail note on :
 - Dimroth Rearrangement
 - Caffiene
- Outline a method of synthesis for :
 - An oxetane
 - Thietane
 - Aziridine
- How do you distinguish carbonyl isomers of the molecular formula $\text{C}_4\text{H}_8\text{O}$ by ^{13}C NMR ?
- Discuss briefly the various applications of ^{13}C NMR Spectroscopy.
- Write the applications of ^{31}P NMR.

3. Outline a method of synthesis for each of the following :

- (a) Uracil
- (b) Thymine
- (c) Cytocine

4. What are the product in the following reactions ?

- (a) Azetidine $\xrightarrow{\text{HNO}_3}$
- (b) 2-Phenyloxetane + HCl
- (c) Thietane + acetyl chloride $\xrightarrow{\text{Heat}}$
- (d) 2-phenyloxirane $\xrightarrow{\text{Heat}}$
- (e) Cis-2-butene $\xrightarrow{\text{CH}_3\text{COOH}}$

5. Discuss the following spectra with at least one example :

- (a) Photon decoupled ^{13}C NMR
- (b) Off resonance decoupled ^{13}C NMR
- (c) Chemical Shift
- (d) Chemical Shift Equivalence
- (e) Tri Methyl Saline (TMS)

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SECTION—B

(Short-Answer-Type Questions)

Note : Section 'B' contains Eight (08) short-answer-type questions of Five (05) marks each. Learners are required to answer any four (04) questions only. $4 \times 5 = 20$

1. Discuss about the advantage and dis-advantage of ^{13}C NMR Spectroscopy.
2. Discuss briefly about the factors affecting Chemical shift of carbon in ^{13}C NMR spectra by giving at least one example in each case.
3. Write a short note on :
 - (a) Homonuclear Coupling
 - (b) Claisen Rearrangement

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