

A-1000

Total Pages : 4

Roll No.

MCH-608

M.Sc. Chemistry (MSCCH)

**Heterocyclic Compounds and
Spectroscopy-III**

Examination February, 2026

Time : 2:00 Hrs.

Max. Marks : 35

Note :- This paper is of Thirty Five (35) marks divided into Two (02) Sections 'A' and 'B'. Attempt the questions contained in these Sections according to the detailed instructions given therein. *Candidates should limit their answers to the questions on the given answer sheet. No additional (B) answer sheet will be issued.*

Section-A

(Long Answer Type Questions) ($2 \times 9\frac{1}{2} = 19$)

Note :- Section 'A' contains Five (05) Long-answer type questions of Nine and Half ($9\frac{1}{2}$) marks each. Learners are required to answer any *two* (02) questions only.

A-1000

(1)

P.T.O.

1. Write short notes on the following NMR experiments/terms used for structure elucidation :
 - (i) COSY test
 - (ii) INADEQUATE
 - (iii) Off resonance
 - (iv) Double resonance
2. What is DEPT experiment in ^{13}C NMR ? What information is obtained from this experiment ? Discuss by taking a suitable example.
3. Write short notes on the following :
 - (a) Classification of heterocyclic compounds with structures
 - (b) Describe the basicity order of furan, thiophene and pyrrole.
4. Explain the importance of heterocyclic compounds as antibacterial, antibiotics and antipyretics. Discuss synthesis of any two heterocyclic compounds possessing these biological activities.
5. Write short notes on the following :
 - (a) Sydnone
 - (b) Dimroth rearrangement
 - (c) Diels-Alder reaction

Section-B

(Short Answer Type Questions) (4×4=16)

Note :- Section 'B' contains Eight (08) Short-answer type questions of Four (04) marks each. Learners are required to answer any *four* (04) questions only.

1. Discuss medicinal importance and chemistry of benzofurans and quinoline.
2. Discuss magnetic behavior of carbon. How this element is useful for structural elucidation by using NMR experiments ? Explain in brief some of the experiments.
3. Discuss briefly about the factors affecting Chemical shift of carbon in ^{13}C NMR spectra by giving at least one example in each case.
4. Write brief notes on the following :
 - (a) Spin-spin coupling
 - (b) Coupling constant
 - (c) Chemical shift
5. An aromatic compound (Molecular mass=135) gives the following signals in its PMR spectrum :
 - (a) Singlet (2.09 δ), 3H

(b) A distorted singlet (3.09 δ), 1H

(c) A multiple! (7.27 δ), 3H

(d) A multiple! (7.75 δ), 2H

Predict the structure of the compound.

6. What are the positive and negative Cotton effects ?
7. Write a short note on Continuous wave mode method recording of ^{13}C -NMR spectra.
8. Discuss the synthesis and reactions of Pyrimidines.
