

P-73

Total Pages : 3

Roll No.

MSCCH-602

Spectroscopy-II

M.Sc. Chemistry (MSCCH)

3rd Semester Examination, 2023 (June)

Time : 2 Hours]

Max. Marks : 70

Note : This paper is of Seventy (70) 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 answer to the questions on the given answer sheet. No additional (B) answer sheet will be issued.

SECTION-A

(Long Answer Type Questions)

Note : Section 'A' contains Five (05) long answer type questions of Nineteen (19) marks each. Learners are required to answer any Two (02) questions only.

(2×19=38)

1. Write notes on following :

(a) *Mclafferty rearrangement.*

(b) *Hyperfine interaction with special reference to Fe⁵⁷*

2. Discuss the following with respect to ^1H NMR spectroscopy :
 - (a) *Proton exchange reactions.*
 - (b) *Solvent effect.*
 - (c) *Chemical Shift.*

3. Write notes on following :
 - (a) *HETCOR.*
 - (b) *NOE.*

4. Write notes on following :
 - (a) *Coupling constant.*
 - (b) *Spin-spin splitting.*
 - (c) *DEPT.*

5. Discuss the various applications of Mossbauer spectroscopy.

SECTION-B

(Short Answer Type Questions)

Note : Section 'B' contains Eight (08) short answer type questions of Eight (08) marks each. Learners are required to answer any Four (04) questions only. (4×8=32)

1. Define shift reagents and decoupling experiments in ^1H NMR spectroscopy.

2. What is the shielded and deshielded nucleus? Explain their effect on chemical shift.
 3. Explain why :
 - (a) ^{13}C is NMR active while ^{12}C is not.
 - (b) Greater sensitivity is needed to record ^{13}C NMR spectra as compared to ^1H NMR spectra.
 4. Explain COSY with suitable examples.
 5. What is the basic Principle of ESR spectroscopy. Explain.
 6. How will you distinguish between the followings by ^1H NMR spectroscopy :
 - (a) *o*-Dibromobenzene and *m*-dibromobenzene
 - (b) 1-Chloropropane and 2-Chloropropane
 7. What is nitrogen rule as applied in mass spectroscopy ? Explain with suitable examples its significance in mass spectral analysis.
 8. Suggest the structure of a compound with molecular formula $\text{C}_{10}\text{H}_{12}\text{O}$, whose mass spectrum shows peaks at m/z 14, 43, 57, 91, 105 and 148.
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