K-390

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MSCCH-602

Spectroscopy-II

M.Sc. Chemistry (MSCCH)

3rd Semester Examination, 2023 (Dec.)

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 answers 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. Explain the methods used for simplification of complicated NMR spectra.

2. Write note on the following :

(a) COSY.

(b) DEPT.

(c) HETCOR.

3. Discuss the Principle, instrumentation and applications of electron spin resonance (ESR) spectroscopy.

4. Explain Mössbauer spectroscopy. Describe some of its important applications.

5. Explain the different types of mass fragmentation mode which can be possible in various organic molecules.

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 the chemical shift and explain the factors affecting the chemical shift in NMR spectroscopy.

2. Explain the spin-spin coupling in AX, AB and AMX spin systems.

3. What is Lande's splitting factor(g). Discuss the factors affecting the "g" values.

4. Write explanatory note on :

(a) Mc Lafferty rearrangement.

(b) Nitrogen rule.

5. Discuss the mass fragmentation pattern in the carbonyl compounds.

6. Define the following in mass spectrometry :

(a) Base peak.

(b) Metastable ion and peak.

7. Predict the ^{1}H-NMR signals with their multiplicity in the following compounds :

(a) n-butane and iso-butane.

(b) Propanone and Propanal.

(c) 1-Chlorobut-l-ene and l-Chlorobut-2-ene.

8. Expalin the basic principle and application of NMR spectriscopy.