A–0407

Total Pages : 3 **Roll No. .....**

MSCCH-504

M.SC. (CHEMISTRY) (MSCCH)

(Group Theory, Instrumentation Chemistry & Computer for Chemist)

Examination, June 2025

Time : 2:00 Hrs. 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 2×19=38

***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.

1. Explain the concept of symmetry elements and symmetry operations in the context of molecular symmetry.

2. Explain the Laue method for determining the crystal structure of a material. How does this technique provide insights into the arrangement of atoms within a crystal ?

3. Explain the principle of thin-layer chromatography (TLC) and its applications in chemical analysis.

4. Discuss the role of computational chemistry and the types of software used in this field.

5. Write short notes on the following :

   (a) Ramchandran diagram or plot

   (b) Separation ofAmino Acids

   (c) Ion-exchange chromatography

Section–B

Short Answer Type Questions 4×8=32

***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.

1. Write point group and symmetry operations of following :

   (a) SF_6

   (b) $CF_2 = CF_2$

2. What are X rays ? Why do we use X-Rays to examine crystal stracture ? How are the X-rays produced in experiment ?

3. Write short notes on the following :

   (a) Accuracy and Precision

   (b) Least SquareAnalysis

4. What are the benefits of using Python or MATLAB for chemical data analysis ?

5. Explain the process and significance of radioisotope dilution analysis in quantitative chemical analysis.

6. Explain the concept of propagation of errors and illustrate it with an example.

7. What are the applications of isotope dilution analysis in scientific research and industry ?

8. Write a short note on the following :

   (a) Gas ionization detectors.

   (b) Data processing

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