**A–0983**

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# MSCCH-504

## M.Sc. Chemistry (MSCCH)

## Group Theory, Instrumentation Chemistry and Computer For Chemist

Examination February, 2026

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. Compare thin layer chromatography (TLC), paper chromatography, and HPLC in terms of principles and applications. (19)

2. Write notes on the following :

   (a) Separation factor

   (b) HEPT (19)

3. Explain the concept of X-ray diffraction along with its application in determining the structure of a crystal that includes Bragg's method. (19)

4. (a) Deduce the character table for the $C_{2v}$ point group. (9)

   (b) What is the significance of character tables in spectroscopy ? (10)

5. What is the Debye-Scherrer method and how is it used in X-ray structural analysis ? (19)

## 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 operation of the following :

   (a) $NH_3$

   (b) $CCl_4$

   (c) NOCl

   (d) $H_2O$

2. Distinguish between relative error and absolute error. How is relative error expressed ?

3. How will you separate mixture of amino acids by paper chromatography ?

4. Explain the following :

   (a) Accuracy and Precision

   (b) Least square Analysis

5. Explain the different techniques of the measurement of radioactivity.

6. Discuss the applications of MA TLAB and MS WORD in chemical data analysis and documentation.

7. Write notes on the following :

   (a) Ion-exchange chromatography

   (b) Computer languages.

8. Explain how lattice energy and ionic radii can be evaluated using experimental data and programming.

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