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Roll No.

MSCCH-504

Group Theory, Instrumentation Chemistry & Computer for Chemist

M.Sc. Chemistry (MSCCH-21)

Ist Semester Examination, 2022 (June)

Time : 2 Hours]

Max. Marks : 80

Note : This paper is of Eighty (80) marks divided into two (02) Sections A and B. Attempt the questions contained in these sections according to the detailed instructions given therein.

SECTION-A

(Long Answer Type Questions)

Note : Section 'A' contains Five (05) long answer type questions of Twenty (20) marks each. Learners are required to answer any Two (02) questions only.

(2×20=40)

1. What is point group? Assign point groups to the following molecules and why?

CO_2 , B(OH)_3 , BF_3 , NH_3 .

2. Write a notes on any three of the following :
- (a) Flame Ionization Detector (FID).
 - (b) Height Equivalent Theoretical Plate (HEPT).
 - (c) Ramchandran diagram.
 - (d) Symmetry elements and symmetry operations.
3. Write a notes on any *three* of the following :
- (a) Types of errors in data analysis
 - (b) Micro and Super computer system
 - (c) Van-Deemter equation (no derivation)
 - (d) Structure analysis of crystal using Laue's method.
4. (a) Discuss the factors affecting column efficiency in column chromatography.
- (b) Write a note on isotopic ditution method.
5. (a) Discuss the chracter table for C_2V , Point group.
- (b) Discuss the great orthogonality theorem (without proof) and its importance.

SECTION-B

(Short Answer Type Questions)

Note : Section 'B' contains Eight (08) short answer type questions of Ten (10) marks each. Learners are required to answer any Four (04) questions only. (4×10=40)

1. Give an account of the planes of symmetry in C_6H_6 and $[Ni(CN)_6]^{-2}$.
2. Derive the Bragg's equation for X-ray diffraction by crystals and discuss its use in the structural analysis.
3. Discuss the principle and application of HPLC.
4. Write a note on classification of chromatography.
5. (a) State law of rational indices. Calculate Miller indices of crystal planes which cut through the crystal axes at $[2a, 3b, c]$.
(b) Write a note on Accuracy and precision.
6. Write a notes on the following :
 - (a) What are the advantages of electron diffraction method over X-ray method?
 - (b) Electron capture detector (ECD) in gas chromatography.

7. Write a notes on the following:
- (a) Discuss the principle and analytical use of ion exchange chromatography.
 - (b) Basic principle involved in radio analytical methods.
8. Explain the following terms for the computer system :
- (a) Computer languages.
 - (b) Algorithms and flowcharts.
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