This question paper contains **3** printed pages]

NEPNY—65—2023

FACULTY OF SCIENCE AND TECHNOLOGY

M.Sc. (NEP) (First Year) (First Semester) EXAMINATION

NOVEMBER/DECEMBER, 2023

CHEMISTRY

Paper-SCHEE-401

(Physical Methods in Chemistry)

(Thursday, 28-12-2023) **Time : 10.00 a.m. to 12.30 p.m.**

Time—2½ *Hours* *Maximum Marks*—60

N.B. :— (*i*) Question No. **1** is compulsory.

(*ii*) Attempt any *three* questions from Q. No. **2** to Q. No. **6**.

(*iii*) Use of logarithm table and simple non-programable calculator is allowed.

1. Answer the following questions : 15

(*a*) Explain centre of symmetry and plane of symmetry with suitable example.

(*b*) Distinguish between accuracy and precision.

(*c*) Explain measurement technique of electron diffraction.

P.T.O.

2. Answer the following questions :

(*a*) (*i*) Define the groups and give various postulates of the group.

(*ii*) Describe matrix representation for the symmetry elements–plane of symmetry and identity. 4+4=8

(*b*) Explain in detail student '*t*' test and student 'Q' test. 7

3. Solve the following questions :

(*a*) Derive Bragg's equation. Find the interplaner distance in a crystal in which a series of planes produces a second order reflection of wavelength 1.5 Å was observed at angle (2Q) equal to 21.975. (sin 10.895° = 0.189). 8

(*b*) List symmetry elements, locate them diagrammatically and find point group of NH_3, HCN, BF_3 molecules. 7

4. Solve the following questions :

(*a*) What is significant figure ? Explain significant figure rule.

"The percentage of constituent of 'A' in compound 'AB' were found to be 48.32, 48.36, 48.23, 48.11 and 48.38 percent. Calculate mean deviation and standard deviation. 8

(*b*) Explain the Debye-Scherrer method of X-ray structural analysis of crystal. 7

5. Attempt the following questions :

(*a*) What is principle of neutron diffraction ? Explain scattering of neutrons by solids and liquids. 8

(*b*) What is character table ? Construct a character table for C_{2v} group. 7

6. Write short notes on : 15

(*a*) Mulliken symbols

(*b*) Miller indices

(*c*) Wierl equation.