| Roll No. | | | | | | | | | **25-CH-24** |

M.Sc. II SEMESTER [MAIN/ATKT] EXAMINATION MAY - JUNE 2025

CHEMISTRY

Paper - IV

[Spectroscopy - II and Diffraction Method]

[Max. Marks : 75]   *[Time : 3:00 Hrs.]*   *[Min. Marks : 26]*

Note : Candidate should write his/her Roll Number at the prescribed space on the question paper.
Student should not write anything on question paper.
Attempt all five questions. Each question carries an internal choice.
Each question carries **15 marks.**

Q. 1 Explain the theory of NMR spectroscopy and give some examples of NMR active nuclei.

OR

a) Explain spin - spin interaction taking suitable examples.

b) Write a short note on FT NMR and its advantages.

Q. 2 Discuss the theory of NQR spectroscopy.

OR

a) What do you understand by Quadrupole coupling constant ? Explain.

b) Write the applications of NQR spectroscopy.

Q. 3 Answer **any two** of the following -

   i) Explain Zero-field splitting and Krammer's degeneracy.

   ii) Discuss the factors affecting 'g' value.

   iii) Write a short note on Spin Hamiltonian.

OR

Discuss the applications of ESR spectroscopy.

Q. 4 Derive Bragg's equation and explain Bragg's method OR Laue method of X-ray structural analysis of crystals.

OR

Answer **any two** of the following -

i) How can you identify unit cells from systematic absences in diffraction pattern ?

ii) Write a short note on structure of simple lattices and x-ray intensities.

iii) Discuss the absolute configuration of molecules.

Q. 5 a) Write a note on Scattering intensity *Vs* Scattering angle.

b) Discus the study of structure of surfaces through low energy electron diffraction.

OR

a) Explain scattering of Neutrons by solids.

b) Describe the measurement technique and applications of Neutron diffraction.

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