K26P 1174

Reg. No. : .....

Name : .....

Second Semester M.Sc. Degree (C.B.C.S.S. – O.B.E. – Reg./Supple./Imp.) Examination, April 2026

(2023 Admission Onwards)

CHEMISTRY/CHEMISTRY WITH DRUG CHEMISTRY SPECIALIZATION

MSCHE02C08/MSCHD02C08 : Theoretical Chemistry – II

Time : 3 Hours

Max. Marks : 60

SECTION – A

Short answer questions. Answer **any five** questions. **Each** question carries **three** marks. **(5×3=15)**

1. Outline the classification of point groups.
2. List and explain the symbols used for point groups.
3. Construct the character table for C_{2V} point group.
4. Explain group orbitals with an example.
5. Differentiate between Heisenberg's broadening and collision broadening.
6. Explain pre-dissociation.

SECTION – B

Paragraph questions. Answer **any three** questions. **Each** question carries **six** marks. **(3×6=18)**

7. Discuss block diagonalization and similarity transformation.
8. Explain mutual exclusion principle using group theory.
9. Explain the degree of freedom and find the number of molecular vibrations of CO_2 and H_2O.
10. Discuss isotopic effect on rotational spectra. Explain with an example.
11. Write a short note on relaxation methods in NMR.

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SECTION – C

Essay type questions. Answer **any three** questions. **Each** question carries **nine** marks. **(3×9=27)**

12. Explain the reducible and irreducible representations and discuss the method of reduction.
13. Discuss pictorial method, transition moment integral and sigma bonding in octahedral complexes.
14. Outline the importance of fundamental, overtone and hot bands in IR spectroscopy. Explain their origin and significance.
15. Explain chemical shift, shielding and deshielding, spin-spin coupling and coupling constant in NMR.
16. Briefly explain the significances of Fortrat diagram in electronic spectroscopy.
