M.Sc DEGREE EXAMINATION,APRIL 2019
II Year III Semester
Physical Chemistry - III

Time : 3 Hours **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. What is the selection rule for pure rotational transition?
2. Define - Doppler broadening.
3. Define - Q branch.
4. Define - Fermi resonance.
5. Define - spin-orbit coupling
6. Define - Doppler Effects.
7. Sketch the 1H NMR of pure n-propanol.
8. What is meant by isomer shift?
9. Define - Harmonic oscillator.
10. Write any two physical significances for quantum number.
11. Give the term symbol for hydrogen and helium atoms.
12. Define R.S. coupling.

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

13. Explain the Einstein absorption coefficient.
14. Describe the quantum theory of Raman Effect.
15. Derive an expression for the frequency of harmonic vibration of diatomic molecules.
16. Write notes on Zeeman Effect.
17. Explain the Born - Heimer approximation.
18. Explain the MO theory for polyatomic molecules.
19. Explain the Huckel theory for conjugated benzene.

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. Describe the Franck - Condon principle and explain the electronic spectra for polyatomic molecules.
21. Describe the diatomic and polyatomic molecules as non-rigid rotor.
22. Write notes on hyperfine interaction and McConnell reactions.
23. Derive the Schrodinger equation for hydrogen atom.
24. Explain the Valence bond for hydrogen molecule.

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