



Date: 14-11-2024

Dept. No.

Max. : 100 Marks

Time: 01:00 pm-04:00 pm

SECTION A

Answer ANY FOUR of the following

4 x 10 = 40 marks

1. Show the effect of isotopic substitution on the rotational spectrum of a diatomic molecule.
2. Explain with theory, the spectra of a diatomic vibrating rotator.
3. If the bond length of H_2 is 0.07417 nm, what would be the positions of the first three rotational Raman lines in the spectrum?
4. Explain Chemical shift in NMR spectroscopy.
5. Summarize the theory of pure rotational Raman spectra of Symmetric top molecule.
6. Summarize the auger electron spectroscopic technique.
7. Explain the impact of coupling between nearby nuclei and show spectral splitting in NMR spectrum of ethanol molecule.
8. Explain the Larmor precession.

SECTION B

Answer ANY THREE of the following

3 x 20 = 60 Marks

9. Explain how coupling is taking place in NMR spectrum.
10. Explain the vibration spectrum of a diatomic molecule.
11. Discuss about the fundamental vibrations of molecules and their symmetry.
12. Explain the intensity variation in rotational spectrum and derive the expression for energy level J, with maximum population.
13. Explain the electron energy loss spectroscopy (EELS) in detail.
14. Explain the principle and instrumentation of photoelectron spectroscopy in detail.

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