



QP CODE: 25804441



25804441

Reg No :

Name :

INTEGRATED MSc DEGREE EXAMINATION, OCTOBER 2025

Fifth Semester

INTEGRATED MSc BASIC SCIENCES - CHEMISTRY

CORE - ICH5CR04 - PHYSICAL CHEMISTRY II

2020 Admission Onwards

E2532BE8

Time: 3 Hours

Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

Weight 1 each.

1. Write the equation of Beer-Lambert law.
2. Write a short note on spectrum of a non-rigid rotator.
3. Sketch the transitions between the rotational-vibrational energy levels of a diatomic molecule.
4. Compare Raman spectra and Infrared spectra.
5. Write a short note on resonance fluorescence in Raman Spectroscopy.
6. Briefly describe electronic spectra of diatomic molecules.
7. Write a short note on predissociation.
8. Explain Bohr frequency condition.
9. Define fluorescence.
10. Write a short note on ozone layer in the atmosphere.

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

Weight 2 each.

11. Discuss microwave spectroscopy.
12. Select the rotational active molecules and why? HCl, H₂, CO, O₂
13. Distinguish overtones and hot bands.
14. Explain a) combination bands and b) difference bands.
15. Discuss pure rotational Raman spectra of diatomic molecules.





16. In an ESR spectrometer operating at 9.233 GHz, the centre of the spectrum of CH₃ radical occurred at 329.4 mT. Calculate the g-value of the free radical.
17. State Grothus- Draper law and the Stark-Einstein law of photochemical equivalence.
18. Explain low quantum yield reactions with example.

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

Weight 5 each.

19. Discuss the factors which determine the width and intensity of spectral lines.
20. Write a note on IR spectroscopy. Discuss a) Fermi resonance, b) fingerprint regions and group vibrations and c) effect of hydrogen bonding on group frequency.
21. Discuss spin-spin coupling in NMR with an example. Draw a) Pascal's triangle giving intensities of NMR signals b) the low and high resolution spectrum of ethanol.
22. a) Describe chemiluminescence and bioluminescence and point out the differences between them. b) Write a note on Green house effect and ozone layer in the atmosphere.

(2×5=10 weightage)

