

QP CODE: 24018938



Reg No : .....

Name : .....

**MSc DEGREE (CSS) EXAMINATION , APRIL 2024**

**Second Semester**

**CORE - CH500204 - MOLECULAR SPECTROSCOPY**

M Sc ANALYTICAL CHEMISTRY, M Sc APPLIED CHEMISTRY , M Sc CHEMISTRY, M Sc  
PHARMACEUTICAL CHEMISTRY, M Sc POLYMER CHEMISTRY

2019 Admission Onwards

55E6D57E

Time: 3 Hours

Weightage: 30

**Part A (Short Answer Questions)**

*Answer any **eight** questions.*

*Weight **1** each.*

1. What are the main factors that influence the intensity of a spectra?
2. Explain the significance of Born Oppenheimer approximation.
3. Give some important applications of microwave spectroscopy.
4. Determine the normal modes of vibration for (i) benzene, (ii) cyclohexane and (iii) naphthalene.
5. Give a brief description on rotational fine structure in electronic spectroscopy.
6. What is meant by shielding and deshielding of a nucleus.
7. What is the significance of relaxation time?
8. What are the factors which effects chemical shift?
9. What is the effect of pulse in FT NMR spectroscopy?
10. Represent Mcconnel equation and explain its significance.

(8×1=8 weightage)

**Part B (Short Essay/Problems)**

*Answer any **six** questions.*

*Weight **2** each.*

11. Calculate the wave numbers of the lines in the rotational spectrum of CO for the  $0 \rightarrow 1$ ,  $1 \rightarrow 2$ ,  $2 \rightarrow 3$  transitions if the equilibrium bond distance of CO is  $1.131 \text{ \AA}$ ?
12. Briefly explain the rotational spectra of polyatomic molecules.





13. Explain the origin of fundamentals, overtones and hot bands using Morse potential energy curve.
14. Explain the various transitions involved in the electronic spectra of polyatomic molecules.
15. Discuss in detail the application of FT technique in NMR.
16. Write a short note on pulse sequences in NMR.
17. Explain briefly about solid state NMR.
18. Explain the principle and application of NQR Spectroscopy.

(6×2=12 weightage)

### **Part C (Essay Type Questions)**

*Answer any **two** questions.*

*Weight **5** each.*

19. Explain Raman Spectroscopy and its applications.
20. What are lasers? Discuss about different types of lasers? Explain the use of lasers.
21. Discuss the origin of spin spin splitting in NMR and illustrate how structural information can be obtained from coupling constant?
22. Outline the principle of Mossbauer Spectroscopy. Explain isomer shift, hyperfine and quadrapole splitting in Mossbauer spectroscopy.

(2×5=10 weightage)

