

19001840



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Reg. No.....

Name.....

**M.Sc. DEGREE (C.S.S.) EXAMINATION, JUNE 2019**

**Second Semester**

Faculty of Science

Branch : Chemistry

AN 2C 08/AP 2C 08/CH 2C 08/PH 2C 08/POH 2C 08—MOLECULAR SPECTROSCOPY

[Common to all Branches of Chemistry]

(2012 Admission onwards)

Time : Three Hours

Maximum Weight : 30

**Section A**

*Answer any **ten** questions.*

*Each question carries weight 1.*

1. What are the factors that influence the intensity of absorption ?
2. What is the significance of relaxation time ?
3. What is Fermi resonance ?
4. What is the effect of nuclear spin on IR spectral bands ?
5. Is it possible to detect pure rotational spectrum of a spherical top molecule ? Discuss.
6. What are the advantages of resonance fluorescence spectra ?
7. Discuss the Frank Condon principle
8. What is Larmor precession ? How is it used in NMR spectroscopy ?
9. What are the advantages of double irradiation ?
10. What is Kramer's degeneracy ?
11. What are the advantages of HECTOR ?
12. What is the significance of Kramer's degeneracy ?
13. What is the principle of Mossbauer spectroscopy ?

(10 × 1 = 10)

**Turn over**





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### Section B

Answer any **five** questions by attempting not more than **three** questions from each bunch.

Each question carries weight 2.

#### BUNCH 1

14. Distinguish between radiative and non-radiative processes.
15. What are the applications of microwave spectroscopy ?
16. What are the advantages of using Fourier transform in IR spectroscopy ?
17. Compare the method of formation and applications of solid state lasers and gas lasers.

#### BUNCH 2

18. Discuss the various factors influencing the coupling constants in NMR.
19. Explain the chemical shift of  $AB_2$  system.
20. What are the applications of NOE ?
21. Explain the various factors determine the chemical shift in a Mossbauer spectroscopy.

(5 × 2 = 10)

### Section C

Answer any **two** questions.

Each question carries weight 5.

22. (a) Explain the principle and applications of microwave spectroscopy.  
(b) Discuss the mathematical statement of Born - Oppenheimer approximation.
23. (a) 'IR spectroscopy is complementary to Raman spectroscopy'. Discuss.  
(b) What are the applications of X-ray photoelectron spectroscopy ?
24. (a) What is selective decoupling ? Why is it required ?  
(b) Discuss the  $^{13}\text{C}$  chemicals shift values of various carbons.
25. (a) What is NQR spectroscopy ? What are its advantages ?  
(b) Compare the Mossbauer spectra of Fe(II) and Fe(III) cyanides.

(2 × 5 = 10)

