

**M.Sc. DEGREE (C.S.S.) EXAMINATION, AUGUST 2015****Second Semester**

Faculty of Science

Branch : Chemistry

AN2C08/AP2C08/CH2C08/PH2C08/POH2C08—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 a weight of 1.*

1. What are the factors affecting the intensity of absorption of a spectrum?
2. What is meant by signal to noise ratio ?
3. The microwave spectrum of CN shows a series of lines separated by  $3.8 \text{ cm}^{-1}$ . 04. Calculate the inter-nuclear distance between C and N.
4. What is stark effect ?
5. What are the effects of isotopic substitution in microwave spectroscopy ?
6. What is meant by Fermi Resonance ?
7. Distinguish between Raman and Rayleigh scattering.
8. What are the factors effecting the couplings ?
9. What is meant by selective decoupling ?
10. Explain the term 'pre-dissociation'.
11. What are the applications of NQR spectroscopy ?
12. What is the commonly used reference standard in H-NMR ? Why is it preferred ?
13. What is meant by magic angle spinning in NMR spectroscopy ?

(10 × 1 = 10)

**Section B***Answer any five questions.**Each question carries a weight of 2.*

14. Explain the various factors responsible for spectral broadening.
15. Account the occurrence of P, Q and R bands in the vibrational rotational spectrum.
16. What is Stark Effect ? What are its applications ?

**Turn over**

17. What is chemical shift? Explain the factors affecting chemical shift.
18. Briefly discuss the FT spectroscopy. What are its advantages?
19. What is meant by spin decoupling?
20. Account for the fact that the EPR spectrum of  $[\text{Mo}(\text{CN})_8]^{3-}$  gives *nine* peaks.
21. Discuss the terms 'COSY and HETCOR.

(5 × 2 = 10)

### Section C

*Answer any two questions.*

*Each question carries a weight of 5.*

22. Explain the Born-Oppenheimer approximation. What are its significances?
23. What are Lasers? What are different types of lasers? Explain the use of lasers in spectroscopy?
24. Discuss the EPR spectroscopy. What are the factors affecting the 'g', values.
25. Explain the principle and applications of Mossbauer spectroscopy.

(2 × 5 = 10)