



KAA-1770

Seat No. _____

M. Sc. (Sem. II) Examination

April/May - 2013

**CHN - 504 (A) : Chemistry
(Spectroscopy)**

Time : 2 Hours]

[Total Marks : 50

1 Reply any five : 4×5

- (i) Explain why homonuclear diatomic molecules are IR inactive but Raman active ?
- (ii) What are the factors which influence the vibrational frequencies ?
- (iii) How many fundamental vibrational frequencies can be observed in the IR of H_2O , CO_2 , C_2H_6 and C_6H_6 .
- (iv) Discuss Coherent anti-Stokes Raman spectroscopy. Discuss its advantages and limitations.
- (v) What is Resonance Raman Effect ? Discuss its applications.
- (vi) Discuss the applications of Raman Spectroscopy.
- (vii) What is Hooke's law ? How will you calculate the stretching Frequency with the help of the above ?
- (viii) Discuss the quantum mechanical theory of Raman effect.

2 Reply any five : 4×5

- (i) Write a note on ^{31}P NMR.
- (ii) Draw and discuss the NMR spectrum of ethyl alcohol at room temperature and at $-40^\circ C$

- (iii) How will you differentiate ethyl acetate and ethyl-methyl ketone with the help of NMR ? Draw the spectrum.
- (iv) What is the chemical shift ? Discuss the factors affecting it.
- (v) Discuss the splitting of a proton by adjacent one, two, three and four protons.
- (vi) Discuss the factors affecting the chemical shift in ^{13}C NMR.
- (vii) What is the difference between FT and CW NMR ? Discuss the advantages of FT over CW NMR.
- (viii) Discuss the ^{13}C - ^1H coupling.

3 Reply any **five** :

2×5

- (i) What is relaxation process ?
- (ii) What is the difference between chemical shift and spin-spin coupling ?
- (iii) Differentiate between vibrational and rotational spectroscopy.
- (iv) Discuss the effect of H bonding on IR spectra.
- (v) ^1H NMR is obtained readily but ^{13}C takes time.
- (vi) What is the importance of FT IR ?
- (vii) What do you mean by finger print region ?
- (viii) What is the basic requirement to get NMR of any nuclei ?
- (ix) What is the difference between internal and external reference ? Explain with suitable examples.