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# AAL-7332 Seat No._____

## M. Sc. (Sem. II) Examination

### April / May - 2018

### CHN - 504 A : Spectroscopy

Time : 2 Hours] [Total Marks : 50

1 Answer any **five** of the following : 20

(1) What are the factors which influence the vibrational frequencies ?

(2) How many fundamental vibrational frequencies can be observed in the IR of $C_2H_2$, $C_2H_4$, $C_6H_6$ and $CO_2$ ?

(3) What is Hooke's law ? How will you calculate the stretching frequency with the help of above law ?

(4) Explain P, Q and R branches.

(5) Why homonuclear diatomic molecules are IR inactive but Raman active. Explain it.

(6) Give an account on Vibrational Raman Spectra.

(7) Give chemical analysis by Microwave spectroscopy.

(8) What is the differences between IR and Microwave spectroscopy ?

2 Answer any **five** of the following : 20

(1) Distinguish between chemical shift equivalence and magnetic equivalence.

(2) Explain AMX and ABX spin systems.

(3) Give the uses of NMR in medical diagnosis.

(4) Discuss the FT NMR and give their advantages.

(5) Discuss the factors affecting the chemical shift in $^{13}C$ NMR.

(6) Give an account on the importance of coupling constant.

(7) Give an account on $^{19}F$ NMR with applications.

(8) Explain Proton coupled and Proton decoupled $^{13}C$ NMR spectrum.

3 Answer any **five** of the following : 10

(1) What is stark effect ?

(2) What is the selection rule for Raman spectra ?

(3) What is spin-spin relaxation ?

(4) What are nuclear spin and isotopic abundances of $^{13}C$ and $^{31}P$ ?

(5) What are overtones and hot bands ?

(6) Define the HCN, $N_2$ and $O_2$ molecules as IR active or Raman active.

(7) Write the factors affecting on coupling constant.

(8) Which type of solid and liquid substances can be studied by Microwave spectroscopy ?

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