PC-1734/M

L-7/2050

INORGANIC SPECTROSCOPY-II-413
(Semester-IV)

Time : Two Hours] [Maximum Marks : 55

Note : Attempt any *four* questions. All questions carry equal marks.

1. (a) Discuss the origin of the NMR signals with the help of magnetizing vector and relaxation.

(b) What do understand by mechanism of electron shielding and spin-spin splitting in NMR spectroscopy, explain?

2. (a) Define the following terms in NMR technique :

(i) Chemical shift.

(ii) Interatomic ring currents.

(b) Discuss the relaxation process in NMR technique.

3. (a) Discuss the effect of nuclear quadrupolar moment in NMR spectroscopy.

(b) Explain the effect of chemical exchange on NMR line width.

4. (a) How will you study the exchange rate between ligands and metal ions with the help of NMR spectroscopy?

(b) Discuss with appropriate example, interpretation of NMR spectra of paramagnetic molecules.

5. (a) Explain the hyperfine splitting in isotropic systems involving more than one nucleus.

(b) Discuss the followings in relation to the EPR technique :

(i) Anisotropic effect, and

(ii) Application of EPR spectroscopy

6. (a) With the help of concept of zero-field splitting, describe EPR spectra of triplet states.

(b) Compare the X- and Q-band spectra with appropriate examples.

7. (a) Discuss the following in mass spectrometry :

(i) finger print applications.

(ii) field ionization techniques.

(b) (i) Discuss the field ionization techniques in mass spectrometry.

(ii) How will you evaluate the heat of sublimation with the help of mass spectrometry?

8. (a) Discuss the basic theory of ORD and its important application.

(b) What do you understand by optical rotation and how it is measured, explain?

9. (a) Draw the lebeled qualitative proton NMR spectrum of ethanol. How will you conform the presence of alcoholic proton in same?

(b) What do you understand by coupling in NMR technique, explain? Give its one important application.

(c) Identify the NMR active nuclei from the following with appropriate explanation :

(i) ^{13}C

(ii) ^{12}C

(iii) ^{14}N

(iv) ^{15}N

(v) ^{31}P

(d) What do you understand by double resonance in NMR technique?

(e) Discuss the number of resonance lines expected in the EPR spectrum of benzene free radical.

(f) Discuss the causes of line width in EPR spectroscopy.

(g) Draw the qualitative EPR spectrum of a Cu(II) square planar complex having N-as four ligating atoms.

(h) Draw qualitative proton decoupled ^{31}P NMR spectra of P $(CH_3)_3$ molecule.

(i) Draw the line diagram of a typical mass spectrometer.

(j) Explain with the help of mass spectrometry, how you will confirm the presense of bromine in CH_3Br?

(k) What do you understand by appearance potential in case of mass spectrometry, explain?