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(Printed Pages 4)

Roll No. _____

19/585

M.Sc. Third Semester Examination, 2019

CHEMISTRY

First Paper

(Applications of Spectroscopy)

Time : Three Hours *Maximum Marks : 100*

Note: Answer **five** questions in **all**. Short answer type Question **No.1** carrying **40** marks is **compulsory**. Answer **one** question carrying **15** marks from each unit. The answers to short answer type questions should not exceed 150 words and the answers to long answer type questions should not exceed 500 words.

1. Write short answers of the following : 4×10=40

(a) Write a note on g-tensors.

(b) Define Fermi resonance.

P.T.O.

(c) Write a note on the reference solvent used in NMR spectroscopy.

(d) Define the Coupling constant with respect to NMR spectroscopy.

(e) Write the notes on overtone band.

(f) Write the notes on spin-spin interaction in NMR spectroscopy.

(g) Write the application of Mossbauer spectroscopy.

(h) Write a note on Beer Lambert Law.

(i) Define Pascal's triangle.

(j) Define the basic principles of Raman spectroscopy.

Unit-I

2. (a) Explain the symmetry and shapes of AB_3 and AB_4 with suitable example. 5

(b) Explain the mode of bonding of ambidentate ligands. 5

(c) Explain the ESR spectra of F_2^-. 5

OR

3. (a) Explain the basic principles of ESR spectroscopy and also explain the spin polarization for transition metal ions. 8

(b) Explain the techniques involved in the studies of bonding and structures of Fe^{2+} and Fe^{3+} in Mossbauer spectroscopy. 7

Unit-II

4. (a) Define the C-13 NMR spectroscopy. Explain the off-resonance decoupling with suitable examples. 5

(b) Explain the proton exchange reaction in Ethanol. 5

(c) Explain the effect of hydrogen bonding on vibrational rrequency. 5

OR

5. (a) Explain the effect of solvent in electronic itransition in Uv-visible spectroscopy. 7

(b) What is Vibrational Frequency? Explain the vibrational frequencies of aromatic compounds. 8

Unit-III

6. (a) What is complex spin-spin interaction in NMR spectroscopy? Also explain this interaction in two, three and four nuclei. 7

(b) Why Vibrational Frequency of aniline is lesser then that of benzene in acidic Medium. 4

(c) Explain the effect of electronegativity on chemical shift. 4

OR

7. (a) What do you mean by hyperchromic shift and hypochromic shift? How are they affected by auxochrome? 7

(b) Write short notes on the following: 4×2=8

(i) Absorption Laws

(ii) Molar absorbity

Unit-IV

8. (a) What is mass spectrometry? Explain the factors affecting the "Fragmentation process" in mass spectrometry. 8

(b) Explain the application of Mass spectroscopy with suitable example. 7

OR

9. (a) Write short notes on the following: 4×2=8

(i) FD

(ii) FAB

(b) Explain the spin-spin interaction in C-13 NMR spectroscopy. 7