Roll No. ..... Total No. of Sections : 4

Total No. of Printed Pages : 5

Code No. : B03/102

III Semester Examination

M.Sc.

CHEMISTRY

Paper I

[Applications of Spectroscopy]

Time : Three Hours] [Maximum Marks : 80

[Min. Passing Marks : 16

Note : *Part A and B of each question in each unit consists of Very Short Answer Type Questions which are to be answered in one or two sentences. Part C (Short Answer Type) of each question will be answered 200-250 words. Part D (Long Answer Type) of each question should be answered within the word limit 400-450.*

Unit–I

1. (A) Why CCl_4 used as a solvent in IR spectroscopy ? **2**

(B) Write short note on finger print region. **2**

(C) Describe combination bands. **4**

Code No. : B03/102

Or

Discuss the effect of hydrogen bonding and solvent effect on vibrational frequencies.

(D) (i) Explain the instrumentation of FTIR. **6**

(ii) Write a note on orvertones. **6**

Or

(i) How would you distinguish the following pair of compounds by their IR spectra : **6**

(a) CH_3NH_2 and CH_3CONH_2

(b) Phenol and Cyclo-hexanol.

(ii) Describe the various molecular vibrations in IR spectroscopy. **6**

Unit–II

2. (A) What is Pascal triangle ? **2**

(B) Explain splitting of signals in NMR. **2**

(C) Write short note on NOESY (Nuclear Overhauser Exchange Spectroscopy). **4**

Code No. : B03/102

Or

A solid known to be amide showing mass spectrum peaks at *m*/*e*. 87(m), 72, 59, 44 predict the structure.

(D) Write short note on the following : **12**

(i) Me-lafferty rearrangement,

(ii) Metastable peak,

(iii) Mass spectral fragmentation of *n*-pentanol.

Or

Describe in details the general fragmentation modes in mass spectrometry.

(B) Highlight the applications of Mossbauer spectroscopy. **2**

(C) Explain the basic principle of ESR spectroscopy. **4**

Or

How the Mossbauer spectroscopy is helpful for structure determination do know the nature of chemical bond.

(D) Explain the parameters required for evaluating Mossbauer spectroscopy. **12**

Or

Write the factors affecting the *g* value and discuss the applications of ESR spectroscopy.

Unit–IV

4. (A) Explain molecular ion peak. **2**

(B) What is Nitrogen rule ? **2**

(C) Write a note on high resolution mass spectroscopy. **4**

Or

Write short note on shielding and deshielding effect.

(D) (i) What is equivalent and non-equivalent protons ? Explain with suitable examples. **6**

(ii) Determine the structure of C_4H_9Cl molecule from the given data : **6**

δ (ppm)	Splitting	Integration
1.04	doublet	6 H
1.95	multiplet	1 H
3.35	doublet	2 H

Or

Discuss the applications and factors affecting chemical shift in ^{13}C NMR spectroscopy.

Unit–III

3. (A) Explain hyperfine interaction in ESR spectroscopy. **2**