Code No. 6713 / CBCS / N

FACULTY OF SCIENCE

M.Sc. II – Semester (CBCS) Examination, May / June 2017

Subject: Chemistry

Paper – IV
Analytical Techniques & Spectroscopy – II

Time: 3 Hours **Max.Marks: 80**

Note: Answer all questions from Part – A and Part – B.
Each question carries 8 marks in Part-A and 12 marks in Part-B.

PART – A (4x8 = 32 Marks)
[Short Answer Type]

1 a) Write Ilkovic equations and explain the terms present in it.

b) How stability constant of complexes can be determined?

2 a) Write a brief note on solid state NMR.

b) Explain NOE with suitable example.

3 a) The mass spectrum of C_4H_8 gave M(100%) and (M+1) peaks. What is the percentage intensity of (M+1) peak.

b) Explain McLafferty rearrangement with suitable example.

4 a) Write a note on Kramer's degeneracy.

b) Explain how ESCA is useful in the qualitative analysis of elements.

PART – B (4x12 = 48 Marks)
[Essay Answer Type]

5 a) Describe square wave polarography technique and mention its advantages over conventional dc polarography.

b) Write the principle involved in differential thermal analysis and mention its applications.

OR

c) Write the principle involved in Differential Scanning Calorimetry (DSC). Mention its applications.

d) Explain how SO_4^{2-} can be estimated by amperometric titration.

6 a) Explain briefly about the fluxional molecules with suitable examples.

b) How enantiomers can be differentiated by chiral NMR solvents (CSA) and Moscher's acid.

OR

c) Sketch the ^{31}P-NMR spectra for
   i) P_4S_3
   ii) PF_6^-
   iii) H_3PO_2

d) Sketch the ^{19}F-NMR spectra for
   i) SF_4
   ii) 1,2-Dichloro-1,1-difluoroethane and
   iii) IF_5.

7 a) Discuss about the high resolution mass spectrometry. What are the advantages?

b) What are the applications of Gas chromatography – Mass spectrometry (GC-MS)?

OR

c) What is the principle involved in Matrix Assisted Laser Desorption Ionization (MALDI)?

d) Discuss the following with one example each.
   i) β – Cleavage
   ii) Retro Diels Alder.

8 a) The ESR spectrum of methyl radical gave peaks at 3264, 3288, 3312 and 3336 ~~guass~~, ~~when a frequency~~ of 9.273×10^9 Hz is used. Calculate the hyperfine coupling constants (A) and g ($h=6.6 \times 10^{-34}$ J sec., $\beta = 9.273 \times 10^{-24}$ J T^{-1}.

b) Explain how the information about the nature of molecular orbitals can be obtained from PE spectra.

OR

c) Draw and explain the photoelectron spectra of F_2 and O_2.

d) Describe the ESR spectrum of hexachloroiridium (IV) complex.

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