Reg. No. : | | | | | | | | | | |

Question Paper Code: 53963

Ph.D. COURSE WORK EXAMINATION, DECEMBER 2015

Elective

Technology

15PCY102 - STRUCTURAL METHODS IN CHEMISTRY

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

(5 x 20 = 100 Marks)

1. (a) (i) Explain the term Hyperfine splitting. How it is measured? (10)

(ii) Write short notes on

(1) Zero field splitting and

(2) Kramer's degeneracy in paramagnetic complexes. (10)

Or

(b) (i) What are the factors affecting the *g*-tensor values? Explain in detail. (10)

(ii) Discuss the structural elucidation of transition metal complexes by using EPR spectroscopy in detail. (10)

2. (a) (i) Differentiate between IR and Raman spectroscopy. (10)

(ii) Describe the mode of binding of Thiocyanate molecule by using Vibrational and Raman spectroscopy. (10)

Or

(b) (i) Describe the mode of binding of Sulphate molecule by using Vibrational and Raman spectroscopy. (10)

(ii) Discuss the symmetry and shape of AB_2 type molecule on the basis of Vibrational spectral study. (10)

3. (a) (i) Explain the principle, block diagram, various components and working of ^{1}H NMR spectroscopy. (10)

(ii) Write short notes on Nuclear Overhauser effect. (10)

Or

(b) (i) Mention the important structural application of ^{13}C NMR. (10)

(ii) Write a short notes on

(1) Chemical shift and

(2) Spin – spin coupling. (10)

4. (a) (i) How can one do distinction between 3-methyl and 4-methyl cyclohexene on the basis of mass spectroscopy? (8)

(ii) Discuss briefly the principle and working procedure of FAB ionization technique. (12)

Or

(b) (i) Predict the structure of the base peak in the mass spectrum of

(1) n-octane and

(2) 2–methyl pentane. (10)

(ii) Mention the finger print applications in mass spectroscopy. (10)

5. (a) (i) Explain briefly the basic principle, block diagram, instrumentation and applications of Thermogravimetric Analysis (TGA). (12)

(ii) List out the applications of Differential Thermal Analysis (DTA). (8)

Or

(b) (i) Explain the principle, block diagram, various components and working procedure of Thermometric titration methods. (12)

(ii) Differentiate between Differential Thermal Analysis (DTA) and Differential Scanning Calorimetry analysis (DSC). (8)

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