DCA – 510 AC (F)

M.Sc. (Previous) Applied Chemistry Examination, August/September 2008
Directorate of Correspondence Course (Freshers)
Paper – 1.01 : ANALYTICAL AND SPECTROSCOPIC TECHNIQUES

Time : 3 Hours

Max. Marks : 85

*Notes : 1) Answer **any TEN** questions from Part **A**, **TWO** questions from Part **B** and **THREE** questions from Part **C**.*
*2) Figures to the **right** indicate **marks**.*
*3) Repeaters answer **any ONE** question from Part **B**.*

PART – A

(2×10=20)

1. What are indeterminate errors ?
2. What is a calibration graph ? Give its significance in spectrophotometric analysis.
3. Show the possible modes of bonding of NO_3^- in metal complexes.
4. What type of solvents used in ESR ?
5. Distinguish between accuracy and precision.
6. What is partition chromatography ?
7. What are the advantages of TCD ?
8. What is R_f value ? Give its significance.
9. Explain the principle involved in NMR spectroscopy.
10. State nitrogen rule.

P.T.O.

11. What is a shift reagent ? Give an example.

12. Give the characteristics of carrier gas employed in GC.

13. Distinguish between isocratic elution and gradient elution.

14. What are the characteristics of Flame in Flame photometer ?

15. What are the special features of refcrence material used in DTA ?

PART – B

16. a) What are the advantages of thin layer chromatography over other chromatographic methods ?

    b) Analysis of the iron content of a sample gave the following results (in ppm) :

    45.38, 44.56, 46.53, 43.92, 44.03 and 46.94.

    Calculate the mean, median, standard deviation and variance. **(5+5=10)**

17. a) Explain the factors influencing position and intensity of spectral lines.

    b) Discuss the working principles of TGA. **(5+5=10)**

18. a) Explain the factors that influence fluorescence intensity of molecules.

    b) What are the basic principles of gas chromatography ? Outline the working principle of electron capture detector. **(5+5=10)**

PART – C

19. a) Describe the usefulness of infrared spectroscopy in the study of molecule with suitable examples.

    b) Give a brief note on interaction of electromagnetic radiation with matter.

    c) List out the factors that influence resolution in chromatography. **(5+5+5=15)**

20. a) What is ion-exchange capacity of a resin ? Describe the application of ion-exchange technique in the separation of lanthanides.

b) Define the term "chemical shift". What is its significance ? Explain the factors influencing the chemical shift.

c) What is Mclafferty rearrangement ? Give a brief note on the applications of mass spectroscopy. **(5+5+5=15)**

21. a) Give the block diagram of Flame photometry. Name the components and explain their functions.

b) Derive Beer – Lambert's law and discuss the deviation.

c) Describe the sources of determinate errors. How it can be minimized ?

(5+5+5=15)

22. a) With the help of a block diagram indicate the configuration modules used in HPLC. Highlight the applications of HPLC.

b) Give a brief account of applications of EPR spectroscopy in the study of inorganic and organic compounds.

c) Describe the factors that influence TG results. **(5+5+5=15)**

23. a) Discuss in detail the utility of NMR spectroscopy in structure elucidation of organic compounds.

b) Give a brief note on differential scanning calorimetry.

c) Describe the applications of differential thermal analysis. **(5+5+5=15)**