STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86
(For candidates admitted from the academic year 2006-07)

SUBJECT CODE: CH/PC/AI24

M. Sc. DEGREE EXAMINATION, APRIL 2007
BRANCH IV- CHEMISTRY
SECOND SEMESTER
REG.NO …….

COURSE : MAJOR CORE
PAPER : ANALYTICAL INSTRUMENTATION
TIME : 30 MINUTES **MAX. MARKS: 20**

SECTION – A
TO BE ANSWERED ON THE QUESTION PAPER ITSELF.

Answer all the questions. **(20 x 1= 20)**

I. Choose the right answer:

1. The thermogravimetric curve is a plot of
   a) W vs T b) $\frac{dW}{dT}$ vs T c) t vs W d) T vs $\frac{dW}{dT}$

2. The solution to be analysed is flushed with a stream of oxygen in
   a) TGA b) DTA c) polargraphy d) polarimetry

3. The HOTTEST Part of the flame in Flame photometry is
   a) ionic zone b) not spot c) ionisation cone d) interconal zone

4. Mass spectrometry is a technique involving
   a) high temperature b) high pressure c) low pressure d) low temperature

5. Prism monochromators used in infrared spectroscopy are made of
   a) quartz b) NaCl (rock salt) c) nujol d) glass

6. TMS is used as an internal standard in
   a) FTIR b) ICP c) NMR d) ESR

7. The source of radiation used in esr spectroscopy is
   a) hydrogen lamp b) x-radiation c) microwave d) radiowaves

8. The value of diffusion current at its limiting value using a dropping mercury electrode is given by
   a) Ilkovic equation b) Beer Lambert equation
   c) Job's equation d) Nernst equation.

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9. Intensity of signals in NMR refer to
   a) number of total hydrogens b) types of hydrogens
   c) number of nonequivalent protons d) number of each type of protons

10. Hyperchromic shift in electronic spectra refers to
   a) shift to longer wavelength b) shift to shorter wavelength
   c) increase in intensity d) decrease in inensity

II. Fill in the blanks:

11. DSC refers to _____.
12. The potential corresponding to the mid point of the diffusion current wave is known as the _____.
13. The solvent composition remains in _____ elution in HPLC.
14. Stretching vibrations involve _____ energy compared to bending vibrations.
15. Transmittance is _____ of absorbance.

III. Give answer in one or two lines for the following questions : 5x1=5

16. What is finger print region in infrared spectrum?

17. What is meant by microelectrode?

18. Define Gyromagnetic ratio.

19. What is a spectrophotometer?

20. Mention one criteria for satisfactory colourimetric estimation of a substance.

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TIME : 2 HOURS & 30 MINUTES **MAX. MARKS: 80**

SECTION – B

ANSWER ANY FIVE QUESTIONS: **(5x8=40)**

1. a) List any four factors which affect the thermogram.
   b) Discuss the thermogravimetric analysis of Calciumoxalate monohydrate. (4+4)
2. a) Give two advantages and disadvantages each of dropping mercury electrode.
   b) What are the advantages of amperometry over polarography. (4+4)
3. Discuss the principle and working of cydic voltametry. (8)
4. Define retention time and retention volume. What are the three major industrial applications of GLC. (8)
5. a) Discuss the principle and application of inductively coupled plasma atomic emission spectroscopy.
   b) Why is HPLC superior to GLC? (4+4)
6. a) Compare the basic principles of NMR and ESR spectroscopy.
   b) Give the schematic diagram of a mass spectrometer using a single magnetic analyzer. (4+4)
7. a) Discuss the optical systems and detectors used in flame photometry.
   b) How is Ca estimated using AAS? (4+4)

SECTION – C

Answer any two questions. **(2x20=40)**

8. a) Draw the block diagram of a uv-visible spectrophotometer and name all the components.
   b) How is ascorbic acid estimated using colourmetric method?
   c) Write notes on time of flight analyses and thermal conductivity detectors in mass spectrometer. (6+6+8)

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9. Discuss the principle and instrumentation of
   a) HPLC b) FIIR c) ESR (7+7+6)

10. a) What are the conditions for thermometric titrations? Give the experimental set up and discuss the titration of NaOH vs HCl using thermometric titration.
    b) Describe the apparatus used in polarography.
    c) Discuss the interpretation of polargraphic waves. (10+5+5)

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