STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86
(For candidates admitted during the academic year 2004 –05 & thereafter)

SUBJECT CODE: CH/MC/AC54

B.Sc. DEGREE EXAMINATION, NOVEMBER 2008
BRANCH IV- CHEMISTRY
FIFTH SEMESTER

REG.NO .....

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

SECTION – A **(30x1=30)**

ANSWER ON THE QUESTION PAPER ITSELF:

Answer all the questions:

I Choose the correct answer from the following: 10x1=10

1. Microwave radiation lie in the wavelength region
   a) 10nm-100pm b) 1nm-10nm c) 1 μm-100 μm d) 10m- μm100

2. The number of fundamental vibrational modes for a linear molecule of the type AB_2 is
   a) 3 b) 2 c) 4 d) 6

3. Benoic acid is purified by
   a) distillation b) recrystallisation c) sublimation d) TLC

4. The selection rule for the transition in rotational energy level in Raman spectra is
   a) $\Delta J = \pm 1$ b) $\Delta J = +1$ c) $\Delta J = +2$ d) $\Delta J = \pm 2$

5. The number of vibrational degree of freedom for a non linear molecule is
   a) 3n-6 b) 3n-5 c) 3n-4 d) 3n-2

6. Which of the following is correct as per significant figures in the following arithmetic operation 60.3 + 1.05 – 0.162 = ?
   a) 61.2 b) 61.88 c) 61.19 d) 61.20

7. TGA can be carried out using
   a) differential colorimeter b) DTA apparatus
   c) Calorimeter d) Thermo balance

8. Median of 2,3,8,6,9,5,7 is
   a) 5 b) 6 d) 4 d) 7

9. The stationary phase in paper chromatography is
   a) Silica b) solvent c) Water absorbed on paper d) Solute

10. Halfwave potential of an electroactive species depends on
    a) temperature b) concentration
    c) supporting electrolyte d) capillary size

II State whether the following statements are true or false: 5x1=5

11. The velocity of light in different media is different.
12. Hydrogen is used as a carrier gas in GLC.
13. Lanthanides can be separated by ion exchange.
14. Electrophoresis is used in clinical diagnosis.
15. Column chromatography is based on the principle of adsorption.

III Fill in the blanks with correct answer: 5x1=5

16. _____ is a measure of concentration of matter.
17. The process in which solid gets directly converted into vapour is known as _____
18. R_f values is = $\frac{?}{?}$.
19. The solvent used for separating the components of a mixture in chromatography is known as _____.
20. In amperometric Titration, the titration curve is a plot of _____ vs _____.

IV Answer in one or two lines: 5x2=10

21. Draw the thermogram of solver nitrate and give the corresponding equations.

22. What is meant by diamagnetism?

23. State and explain Nernst distribution law.

24. Name the detectors used in GLC.

25. Magnetic moment of an ion is 2.83 BM. How many unpaired electrons does it possess?

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TIME : 2½ HOURS **MAX.MARKS : 70**

SECTION – B **5X6=30**

Answer any five questions. All questions carry equal marks.

1. The following percentage values were obtained in the analysis of a sample of an alloy of manganese: 8.71, 8.65, 8.68, 8.77, 9.01, 8.72. Determine average value, median and range.
2. Discuss the sampling techniques involved in IR.
3. Explain with a neat diagram the instrumentation for thermometric titration and discuss the titration of HCl vs NaOH.
4. Discuss the principle and any three applications of TLC.
5. Explain, using a neat diagram various components of a photoelectric colorimeter. What is the filter to be used in the estimation of Fe^{3+}. (5+1)
6. State and explain Curie Weiss law. Give any three applications of magnetic moment. (3+3)
7. Explain a) Diffusion current b) Ilkovic equation (3+3)

SECTION – C **2X20=40**

Answer any two questions. All questions carry equal marks.

8. a) How is the Ni-DMG complex estimated by colorimeter? (10)
   b) With a neat diagram explain the instrumentation for IR. (5)
   c) Explain giving examples : (i) chromophore (ii) auxochrome. (5)

9. a) Explain the origin of Raman effect. (5)
   b) What is dipole moment? What are the factors affecting it? How is it determined by Temperature method? (10)
   c) Explain the Beer – Lambert's Law. (5)

10. a) Write a note on 'errors' (6)
    b) How can dipole moment values be used to distinguish between geometrical isomers? (4)
    c) Discuss TG and DTA curves for calcium oxalate monohydrate. (3+3)
    d) Why is water not used as a solvent in IR spectroscopy? (4)

11. a) Discuss principle working and applications of HPLC. (8)
    b) What are the advantages and disadvantages of using dropping mercury electrode? (5)
    c) Why should oxygen be removed from the solution before carrying out polorographic analysis? (3)
    d) Explain time-of-flight mass spectrometer. (4)