LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – **CHEMISTRY**

FIRSTSEMESTER – APRIL 2018

CH 1815- ANALYTICAL CHEMISTRY

Date: 30-04-2018 Dept. No. Max. : 100 Marks

Time: 09:00-12:00

Part-A

Answer ALL questions. **(10 × 2= 20)**

1. How many significant figures does each of the following numbers have?
   a) 5000.0 b) 4.20×10^{10}
2. What are random errors? Give an example.
3. State the principle of column chromatography.
4. How is the purification of solvents carried out before using them for HPLC?
5. What is the principle of electrogravimetry?
6. Define equivalence point in acid-base titrations.
7. What is the principle of differential scanning calorimetry?
8. State Beer-Lambert's law.
9. How does the rigidity of the structure affect the fluorescence of a molecule? Give an example.
10. What is intersystem crossing?

Part-B

Answer any EIGHT questions. **(8 × 5= 40)**

11. What is the significance of van Deemter equation? Explain the various terms involved in it.
12. Explain any three types of systematic errors with suitable examples.
13. Discuss the significance of thermal compartments in gas chromatography.
14. Explain any three methods of column packing in HPLC.
15. Describe the working principle of capillary electrophoresis.
16. Write a short note on the spectral and chemical interferences in atomic absorption spectroscopy.
17. What are the factors affecting thermogravimetry? Explain any three factors with examples.
18. How are nickel and cobalt separated by coulometry? Explain.
19. How is copper determined by electrogravimetry?
20. Calculate the normality of (i) nitric acid containing 6.3g/L and (ii) KOH solution ` containing 11.2 g/L.
21. Explain the principle and significance of inductively coupled plasma spectrometry.
22. How is sulphate determined by turbidimetry? Explain.

Part-C

Answer any FOUR questions. **(4 × 10= 40)**

23a. Analysis of citric acid in lemon juice yielded the following % values:
9.16, 9.14, 9.08, 9.09, 9.12, 9.21, 9.14 and 9.11. Calculate the average deviation, standard deviation and variance.

b. State the principle of GSC and GLC. (6+4)

24. Write a short note on (i) ion-selective electrodes and (ii) sample injection systems in gas chromatography. (4+6)

25. Briefly explain the instrumentation of flame emission spectroscopy with a neat block diagram.

26. Explain the working principle of flame ionization detector and thermal conductivity detector.

27. What are the two types of burners used in atomic absorption spectroscopy? Explain their advantages and disadvantages.

28a. Show that $p^H = \frac{1}{2}pK_w + \frac{1}{2}pK_a - \frac{1}{2}pK_b$ for the hydrolysis of a weak acid and a weak base.

b. How is the following chemical equilibrium studied potentiometrically?
$Ce^{3+} + Fe^{3+} \leftrightharpoons Ce^{4+} + Fe^{2+}$ (5+5)

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