LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIRST SEMESTER – **APRIL 2022**

PCH 1504 – ANALYTICAL CHEMISTRY

Date: 21-06-2022   Dept. No.   Max. : 100 Marks
Time: 01:00 PM - 04:00 PM

Part – A

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

1. The weight percent of an element in a sample gave the following results 55.95, 56.00, 56.04, 56.08 and 56.23. Apply the Q-test to check if the value 56.23 can be discarded or not (Q cri=0.54).
2. Highlight the significances of correlation coefficient.
3. State the principle of GSC.
4. Write Van Deemter equation and mention the terms involved in it.
5. Define leveling effect in non-aqueous solvents
6. Write the role of masking agents in complexometric titration.
7. Calculate the weight of copper deposited in 2 h by a current of 500 mA. Calculate the weight of copper under the same experimental condition if the current efficiency is only 95%.
8. A 0.180 g of a purified organic acid sample was titrated coulometrically with hydroxide ions produced in 5 minutes by a constant current of 0.514 amps. Calculate the molar mass of the acid if n is one.
9. State Beer-Lambert's law.
10. What are the differences between AAS and FES?

Part – B

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

11. What is normal error curve? Mention its importance.
12. Seven analyses for the phosphorous content of a fertilizer resulted in 16.2, 17.5, 15.4, 15.9, 16.8, 16.3 and 17.1%. Find the 95% confidence interval for the true value of μ (t=2.571).
13. How are C, H, N and S determined using GC?
14. What are the different types of detectors used in GC? Explain FID with a neat diagram.
15. Discuss the different types of columns used in HPLC.
16. Explain TGA of calcium oxalate monohydrate.
17. Discuss the classification and characteristics of non-aqueous solvents.
18. Differentiate between iodimetric titration and iodometric titration.
19. In a coulometric titration 25 mL of Ce (IV) was reduced by electrolytically generate Fe(II) at 250 mA current in 15 min. Calculate the concentration of Ce(IV).

20. State the principle of electrogravimetry and discuss the electrogravimetric estimation of copper.

21. Describe the importance of biochemical electrodes.

22. What is spectrophotometric titration? How is Fe(III) determined spectrophotometrically?

Part – C
Answer any FOUR Questions. **(4 × 10= 40)**

23. a) The antibiotic assay of a fermented broth was done by two methods and the data obtained are given

   below. Assess the precision of the two methods applying F-test (F=5.19). **(5)**

   Method I ($\mu g/L$) - 2.3, 2.4, 2.2, 2.1, 2.4

   Method II ($\mu g/L$)- 2.5, 2.6, 2.2, 2.3, 2.7

   b) A random sample of nine observations shows a mean of 4.13 with a standard deviation of 0.189.

   Test whether the sample values deviate from the mean of 4.0? (t_{table}=2.306) **(5)**

24. Discuss the principle, instrumentation and applications of capillary electrophoresis.

25. Discuss the reactions of ethanol and acetic acid in non-aqueous titrations.

26. a) Explain the thermal behavior of $CuSO_4.5H_2O$ by DTA. **(5)**

   b) Describe the factors affecting thermogram. **(5)**

27. How is potentiometry used to study chemical equilibrium of Ce^{3+}, Ce^{4+} and Fe^{2+}, Fe^{3+} system?

28. Discuss the principle, instrumentation and applications of AAS.

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