LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

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

FIRST SEMESTER – **NOVEMBER 2024**

PCH1MC04 – ANALYTICAL CHEMISTRY

Date: 15-11-2024 Dept. No. Max. : 100 Marks

Time: 01:00 pm-04:00 pm

	SECTION A – K1 (CO1)
	Answer ALL the questions **(5 x 1 = 5)**
1	**Fill in the blanks**
a)	The F-test is used to compare the ---------- of two or more samples.
b)	The time required to elute the non-retained solutes is known as ---------- .
c)	The principle involved in the electrogravimetry method is ----------.
d)	---------- is used as an indicator in titrating a strong acid with a weak base.
e)	---------- spectroscopy is useful for the determination of alkali and alkaline earth metals.
	SECTION A – K2 (CO1)
	Answer ALL the questions **(5 x 1 = 5)**
2	**Answer the following**
a)	Differentiate analytical and statistical sample.
b)	Define retention factor.
c)	What is the principle of thermometric titration?
d)	Define the autoprotolysis constant.
e)	Name any two applications of fluorimetry.
	SECTION B – K3 (CO2)
	Answer any THREE of the following **(3 x 10 = 30)**
3	Explain the following significant tests performed in statistical analysis: (i) student's 't' test (ii) chi-square test.
4	Discuss the van Deemter equation and its importance in optimizing the separation efficiency of a chromatogram.
5	Sketch and interpret the thermogram of copper sulphate pentahydrate obtained in thermogravimetric analysis.
6	Explain the principle involved in complexometric titrations and mention the factors influencing the stability of complexes.
7	Describe the principle, instrumentation and applications of atomic absorption spectroscopy.

	SECTION C – K4 (CO3)	
	Answer any TWO of the following	**(2 x 12.5 = 25)**
8	(i) Five replicate determinations of Na_2CO_3 in the standard gave the following results (%): 98.71, 98.59, 98.62, 98.44, 98.58. Test whether the sample values deviate from the mean of 98.76%. (t =2.78). (ii) Describe the principle of flame emission spectrometry.	(7.5+5)
9	(i) Discuss the principle, advantages, and applications of mass spectrometry as a detector in gas chromatography. (ii) A chromatogram shows a peak with a retention time of 8.4 minutes and a baseline width of 0.7 minutes on a 3.0 m column. Calculate the number of theoretical plates and plate height.	(8.5+4)
10	(i) What are the factors influencing the thermograms? (ii) Sketch and explain the TGA of calcium oxalate monohydrate.	(7.5+5)
11	(i) Highlight the applications of non-aqueous solvents. (ii) What are the principles of nephelometry and turbidimetry?	(7.5+5)
	SECTION D – K5 (CO4)	
	Answer any ONE of the following	**(1 x 15 = 15)**
12	(i) Illustrate the different types of sampling with suitable examples. (ii) Discuss the working principle of a reciprocating pump used in HPLC. How does it maintain a constant flow rate? (iii) Give a detailed account of DTA technique and its applications.	(5+5+5)
13	(i) Discuss in detail the principle and titration curve of weak dibasic acid vs strong base. (ii) Write the factors that influence fluorescence emission.	(10+5)
	SECTION E – K6 (CO5)	
	Answer any ONE of the following	**(1 x 20 = 20)**
14	(i) Calculate (a) average deviation (b) 90% confidence limit of the following data: 7.146, 7.098, 6.942, 7.256 and 6.593. (t = 2.78) (ii) Compare packed and capillary columns in GC. (iii) How is the equivalence point detected in glacial acetic acid titration?	(10+5+5)
15	(i) Explain in detail the estimation of copper by electrogravimetric method. (ii) Discuss in detail the principle, instrumentation and applications of spectrophotometric titration.	(10+10)
