LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIRST SEMESTER – **NOVEMBER 2022**

PCH1MC04 – ANALYTICAL CHEMISTRY

Date: 30-11-2022 Dept. No. Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

SECTION A

Answer ALL the Questions

1.	**Answer the following.**		**(5 x 1 = 5 Marks)**	
	a)	Define gross sample.	K1	CO1
	b)	What is retention time?	K1	CO1
	c)	Define autoprotolysis constant.	K1	CO1
	d)	Mention any two applications of DSC.	K1	CO1
	e)	Define delayed fluorescence.	K1	CO1
2.	**Answer the following.**		**(5 x 1 = 5 Marks)**	
	a)	Cite the significance of *Q*-test.	K2	CO1
	b)	Mention the significance of electrophoresis.	K2	CO1
	c)	Write the principle involved in complexometric titration.	K2	CO1
	d)	Calculate the time required to deposit 0.86 g of silver, if the current flow is 8.3 A.	K2	CO1
	e)	Name any two luminescent indicators.	K2	CO1

SECTION B

Answer any THREE of the following in 500 words **(3 x 10 = 30 Marks)**

3.	Illustrate the statistical tool covariance, its types and compare with variance and correlation.	K3	CO2
4.	a) Explain the Martin-Synge's plate theory in chromatography. **(6)** b) Comment on the capacity factor in chromatography. **(4)**	K3	CO2
5.	Highlight the applications of non-aqueous solvents.	K3	CO2
6.	What factors would to choose to regulate the thermograms?	K3	CO2
7.	What approach would you select to state the principle of turbidimetric analysis?	K3	CO2

SECTION C

Answer any TWO of the following in 500 words **(2 x 12.5 = 25 Marks)**

8.	a) Explain the variance-ratio (*F*) test in statistical analysis of data. b) The percentage of constituent A in compound AB are 22.61, 22.64, 22.54 and 22.53. Calculate mean deviation and relative mean deviation.	K4	CO3

	(6.5+6)		
9.	a) Elaborate the factors influencing the HETP in Van Deemter equation in chromatography. **(8.5)** b) Differentiate chemical and solvent interferences in AAS. **(4)**	K4	CO3
10.	a) Fe(III) content in 0.8202 g of sample was determined by coulometric reduction to Fe(II) at a platinum cathode. Calculate the percentage of $Fe_2(SO_4)_3$ (M= 399.88 g/mol) in the sample, if 103.2775 C were required for the reduction. **(8)** b) How can you make a distinction between iodimetry and iodometry? **(4.5)**	K4	CO3
11.	a) How will you estimate oxine using constant current coulometry? **(7.5)** b) A mixture contains codeine and morphine. How would you separate them using a fluorimeter? **(5)**	K4	CO3
	SECTION D		
Answer any ONE of the following in 1000 words (1 x 15 = 15 Marks)			
12.	a) How is Student's *t*-test used in determining the confidence interval? Mention the condition where the *t* value approaches *z* value. **(6)** b) Explain the following terms. i) dead time ii) adjusted retention time iii) relative retention time **(6)** c) Calculate the volume of 0.12 mol dm^{-3} $Ba(OH)_2$ solution which will neutralize 10 cm^3 of 0.16 mol dm^{-3} HNO_3 solution. **(3)**	K5	CO4
13.	a) Describe the spectrophotometric determination of Iron. **(9+6)** b) Explain the DTG thermogram of copper sulphate pentahy drate.	K5	CO4
	SECTION E		
Answer any ONE of the following in 1000 words (1 x 20 = 20 Marks)			
14.	a) Illustrate the Pearson's chi-square test and testing procedure to analyse the categorical data. The following table containing parameters x and y are linearly related. From the following x and y values, determine the linear least squares line. **(10)**	K6	CO5

x	1	2	3	4	5	6	7	8	9	10
y	4.7	9.0	13.1	19.4	23.0	26.9	33.0	35.6	40.1	44.6

	b) Write the formula for the chromatographic resolution and mention the terms involved in it. **(6)** c) How would you plot any two titration curves obtained in acid base titrations? **(4)**		
15.	a) Explain the instrumentation and any two applications of AAS? b) How is quantitative fluorometry used to determine the amount of	K6	CO5

	quinine in samples of tonic water? c) Describe any one application of differential scanning colourimetry? **(8+7+5)**		

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