25CHU102

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2025
(First Semester)

Branch - **CHEMISTRY**

ANALYTICAL CHEMISTRY

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	Carcinogenic chemicals primarily cause a) Burns b) Cancer c) Allergies d) Fractures	K1	CO1
	2	Which of the following methods is best for neutralizing strong acid spills on laboratory floors? a) Washing with water only b) Covering with sawdust c) Sprinkling with sodium carbonate/bicarbonate d) Using acetone as neutralizer	K2	CO1
2	3	In semi-micro qualitative analysis, the advantage of using small quantities of reagents and samples is a) Increased accuracy of results b) Elimination of interfering ions c) Reduced reagent consumption and minimized hazards d) Faster heating during evaporation	K1	CO2
	4	The reason for using porcelain or silica crucibles in semi-micro qualitative analysis, during evaporation is a) They resist attack by strong acids and alkalis b) They allow uniform heat distribution and prevent spattering c) They accelerate the common ion effect d) They prevent adsorption of precipitates	K2	CO2
3	5	In a titration of Fe^{2+} with $K_2Cr_2O_7$, which indicator system is correctly matched? a) Diphenylamine sulfonate – external indicator b) Starch – internal indicator c) Diphenylamine – internal indicator d) Methyl orange – external indicator	K1	CO3
	6	Which one of the following is not a characteristic of a primary standard? a) High purity b) High equivalent weight c) Hygroscopic in nature d) Stable in air	K2	CO3
4	7	Which of the following is not a correct precaution to minimize surface adsorption in gravimetric analysis? a) Digesting the precipitate in the mother liquor b) Precipitating from a hot, dilute solution c) Washing with distilled water alone d) Adding electrolytes to the washing solution	K1	CO4
	8	A sequestering agent functions by a) Adsorbing colloidal impurities on the precipitate b) Forming a soluble but stable complex with interfering ions c) Removing co-precipitated oxides during ignition d) Decomposing organic precipitants at high temperature	K2	CO4
5	9	Which chromatography type relies primarily on charge interactions between solute and stationary phase? a) Column chromatography b) Thin-layer chromatography c) Ion-exchange chromatography d) Paper chromatography	K1	CO5
	10	In azeotropic distillation, the separating agent (entrainer) works by: a) Forming a new azeotrope with a lower boiling point. b) Increasing vapor pressure of both components equally. c) Reducing the miscibility of components. d) Breaking hydrogen bonds irreversibly.	K2	CO5

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SECTION - B (35 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	i) Illustrate the methods of handling ethers, toxic and Poisonous chemicals. ii) Write any three precautions methods to avoid accidents.	K2	CO1
		(OR)		
	11.b.	Explain calibration and grading of volumetric glassware.		
2	12.a.	Identify how the solubility product principle and common ion effect are applied in the selective precipitation of sulphides in cation analysis.	K3	CO2
		(OR)		
	12.b.	Write a detail notes on spot test analysis for Ni^{2+} $Al3^{+}$and Cu^{2+} ions.		
3	13.a.	Differentiate between primary standard and secondary standard with examples.	K4	CO3
		(OR)		
	13.b.	Explain the principle of acid–base titrations and analyse the role of indicators in detecting the end point		
4	14.a.	Compare specific and selective precipitants with examples, and state why this distinction is important.	K4	CO4
		(OR)		
	14.b.	Give in details the phenomena of co-precipitation and post-precipitation		
5	15.a.	Discuss in detail the criteria for selecting a desiccant for laboratory drying.	K3	CO5
		(OR)		
	15.b.	Write notes on the technique and applications of vacuum distillation.		

SECTION - C (30 Marks)

Answer **ANY THREE** questions
ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Write in detail the hazards in laboratories and the safety measures to minimize them.	K4	CO1
2	17	Examine the techniques involved in semi-micro qualitative analysis with reference to the following (a) Filtration and washing of precipitates (b) Evaporation and heating of solutions (c) Removal of interfering ions (d) Transferring Residue	K5	CO2
3	18	Discuss the principles and procedures of the following? a) Titration of Fe^{2+} with potassium dichromate using internal and external indicators. b) EDTA titrations involving Zn^{2+} and Ni^{2+} ions.	K6	CO3
4	19	Describe in detail the gravimetric estimation of Nickel using Dimethylglyoxime (DMG)	K4	CO4
5	20	Explain in detail the principles and applications of column, paper, thin layer, and ion-exchange chromatography.	K5	CO5

Z-Z-Z END