U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

September / October 2023 Semester End Main Examinations

Programme: B.E. **Semester: IV**
Branch: Chemical Engineering **Duration: 3 hrs.**
Course Code: 22CH4PCANI **Max Marks: 100**
Course: Analytical Instruments **Date: 22.09.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	*CO*	*PO*	Marks
1	a)	Explain the classification of instrumental methods used in analytical chemistry and discuss their significance in qualitative and quantitative analysis.	*CO1*	*PO1*	**10**
	b)	Differentiate between precision and accuracy. Elucidate the external standard calibration method used in analytical instruments.	*CO 2*	*PO1*	**10**
		UNIT - II			
2	a)	Discuss the origin of light absorptions in the UV regions. Explain the electronic transitions that occur in organic compounds leading to UV absorption.	*CO1*	*PO1*	**10**
	b)	Explain the fundamental principle of Beer's law in UV spectroscopy and illustrate its deviation under certain conditions.	*CO2*	*PO1*	**10**
		UNIT - III			
3	a)	State the working principle of UV spectroscopy with a neat sketch by illustrating and labelling the instrumentation involved.	*CO2*	*PO 1*	**10**
	b)	Discuss the applications of UV and IR spectroscopy in various chemical analysis.	*CO4*	*PO 5*	**10**
		UNIT - IV			
4	a)	Explain the principle of thermogravimetric analysis and differential scanning calorimeter with a neat sketch.	*CO1*	*PO1*	**10**

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		b)	Elucidate the instrumentation of bomb calorimeter highlighting its components and working principles.	*CO2*	*PO1*	**10**
			OR			
	5	a)	Describe the principle of gas chromatography, including the carrier gas, stationary phase, and the separation process.	*CO2*	*PO1*	**10**
		b)	Discuss the different types of detectors used in gas chromatography. Explain the working mechanism and detection capability of flame ionization detector.	*CO3*	*PO2*	**10**
			UNIT - V			
	6	a)	Discuss the characteristic and working of electron capture detector used in gas chromatography.	*CO4*	*PO5*	**10**
		b)	Explain the procedure for performing qualitative analysis using gas chromatography.	*CO5*	*PO12*	**10**
			OR			
	7	a)	Illustrate the principle of High-Performance Liquid Chromatography (HPLC) and its instrumentation parts with neat sketch.	*CO5*	*PO12*	**10**
		b)	List the different types of columns used in HPCL? Explain the working function of normal phase column used in HPLC.	*CO2*	*PO1*	**10**

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