U.S.N.										

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

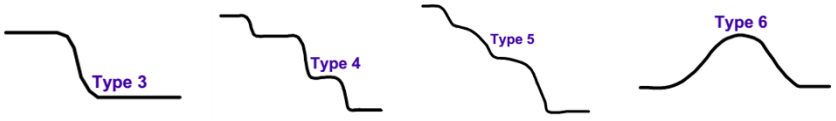
Autonomous Institute Affiliated to VTU

August 2024 Semester End Main Examinations

Programme: B.E. **Semester: IV**
Branch: Chemical Engineering **Duration: 3 hrs.**
Course Code: 23CH4ESANI **Max Marks: 100**
Course: Analytical Instruments

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.

			CO	PO	Marks
		UNIT - I			
1	a)	Differentiate between qualitative and quantitative analysis. A farmer brought several varieties of potatoes and wants to test for the presence of iodine qualitatively. Describe how he can identify iodine using classical methods.	*CO* 1	*PO 1*	**10**
	b)	Explain the external standard calibration method in analytical chemistry. Discuss its advantages and limitations	*CO* 2	*PO 2*	**10**
		UNIT - II			
2	a)	Explain the origins of light absorptions in UV-vis and IR Spectroscopy.	*CO* 1	*PO 1*	**10**
	b)	The absorbance of a Cu sulphate solution containing 0.5 mg Cu/ml was reported as 0.35 at 440 nm. What will be the absorbance if the solution is diluted to twice its original volume? Assume that a 1 cm cuvette was used.	*CO* 1	*PO 1*	**05**
	c)	Discuss the deviations in Beer's Law.	*CO* 1	*PO 1*	**05**
		OR			
3	a)	Draw a neat labelled instrumentation diagram for UV-vis and FTIR spectrometry.	*CO 1*	*PO 1*	**10**
	b)	List out the different types of detectors used in IR spectroscopy and explain any one in detail with a neat sketch.	*CO 2*	*PO 2*	**10**
		UNIT - III			
4	a)	Give a brief about the information that can be obtained about a sample using Thermogravimetric analysis (TGA). Interpret the following different types of curves obtained under TGA: 	*CO* 1	*PO 1*	**10**

		b)	Write the working principles of Bomb calorimeter and Power compensated differential calorimeter along with their rough sketches.	***CO*** 1	***PO 1***	**10**
			UNIT - IV			
	5	a)	Explain the principle on which GC works Draw the neat labelled instrumentation diagram of Gas Chromatography (GC) equipment.	***CO*** 1	***PO 1***	**10**
		b)	Describe the working of electron capture detector (ECD) used in gas chromatography with a neat sketch.	***CO*** 1	***PO 1***	**10**
			OR			
	6	a)	Discuss the working of split and split-less injection methods used in Gas Chromatography (GC).	***CO*** 2	***PO 2***	**10**
		b)	Explain the working of Flame ionization detector (FID) used in gas chromatography with a neat sketch.	***CO*** 2	***PO 2***	**10**
			UNIT - V			
	7	a)	Discuss the criteria for selecting mobile phase in High pressure liquid chromatography (HPLC). Draw a neat labelled diagram of HPLC system.	***CO*** 3	***PO 2***	**10**
		b)	Enlist the different types of columns used in High pressure liquid chromatography (HPLC). Explain the any two columns in detail.	***CO***3	***PO 2***	**10**

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