Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–V (NEW) EXAMINATION – WINTER 2024

Subject Code:3151302 Date:02-12-2024

Subject Name:Advance Environmental Instrumentation

Time:10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			Marks
Q.1	**(a)**	Highlight the applications of instruments in various analytical field.	**03**
	(b)	Discuss uses of Spectroscopy in Environmental Engineering.	**04**
	(c)	Enlist types of online sensors used in the Environmental Engineering field and explain sensors used in wastewater and water field?	**07**
Q.2	**(a)**	What is the importance of standard methods in instrumental analysis?	**03**
	(b)	Discuss the instrumental arrangement of AAS.	**04**
	(c)	Enlist Advantages and Limitations of Beer's – Lambert's Law. Discuss applications of Beer's – Lambert's Law in Environmental Engineering.	**07**
		OR	
	(c)	Explain the measurement of turbidity by instrumental method with a neat sketch of the instrument.	**07**
Q.3	**(a)**	Define Spectroscopy. Discuss behavior of molecules in various EMR	**03**
	(b)	Define: Raman Spectroscopy. Describe the types of Scattering in Raman Spectrum with a neat sketch.	**04**
	(c)	Enlist types of the Detectors used in IR Spectroscopy. Explain any one working Principle with a sketch.	**07**
		OR	
Q.3	**(a)**	Explain the interferences involved with analysis of turbidity. How to eliminate them?	**03**
	(b)	Prepare a table depicting the types of chromatography, types of detectors used in it and its application.	**04**
	(c)	Define: Stationary phase, Mobile phase, eluent, eluate, retention time, retention volume, Distribution coefficient k	**07**
Q.4	**(a)**	Explain the terms: Potentiometry, Plolarography, pH	**03**
	(b)	Explain how TDS and conductivity are related to each other?	**04**
	(c)	Enlist the types of detectors used in high performance liquid chromatography and explain principle of each with neat sketch.	**07**
		OR	
Q.4	**(a)**	What is chromatogram? Explain its interpretation.	**03**

	(b)	What is Gas chromatography? Explain its principle, components and applications.	**04**
	(c)	Explain the working principle of ion- selective meter, pH meter and DO meter.	**07**
Q.5	**(a)**	Find the variance for the following data: 57, 64, 43, 67, 49, 59, 44, 47, 61,59.	**03**
	(b)	Explain the statistical techniques to treat data with random errors.	**04**
	(c)	Differentiate between BOD, COD, TOC	**07**

OR

Q.5	**(a)**	Find the absolute and relative errors. The actual value is 135.68 mm and the measured value is 129.66 mm.	**03**
	(b)	Differentiate between following i) determinant error v/s. indeterminate error ii) constant error v/s proportional error	**04**
	(c)	Highlight the significance of TOC. When and where should we use the TOC data/ highlight application of TOC analyzer.	**07**

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