Q. Code: 689500

Reg. No. | | | | | | | | | | | | | |

B.E. / B.TECH. DEGREE EXAMINATIONS, MAY 2023

Fourth Semester

BT18402 – ANALYTICAL METHODS AND INSTRUMENTATION

(Biotechnology)

(Regulation 2018/2018A)

TIME: 3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Learn the working principle and application of spectroscopic methods used for biological products.	**2**
CO 2	Compare and study the principles and applications of spectroscopic methods, mass spectrometry, nuclear magnetic and electron resonance spectroscopic techniques for various biological applications.	**2**
CO 3	Perceive with chromatographic techniques used in various industries such as Biotech/Biopharma/Food/ Etc.,	**3**
CO 4	Intrept the advanced microscopic methods for characterizing the biomolecules/ bioproducts.	**3**
CO 5	Separate the biomolecules using electrophoresis.	**2**

PART- A (10 x 2 = 20 Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	What is the significance / importance of signal to noise ratio in optical instruments?	**1**	**2**
2.	Arrange the different types of electromagnetic wave with increasing order of their λ.	**1**	**2**
3.	Proportionality: how it is used in the determination of unknown concentration.	**1**	**2**
4.	What are the advantages of raman spectroscopy over infrared spectroscopy?	**2**	**2**
5.	In mass spectrometer, what are the parameters that determine the deflection pattern of particles?	**2**	**1**
6.	Sketch the ^{13}C NMR of ethyl alcohol.	**2**	**1**
7.	Give reasons for band broadening in chromatograms.	**3**	**2**
8.	Name any four detectors used in liquid chromatography.	**3**	**1**
9.	What are the advantages of STM over AFM?	**4**	**2**
10.	What is electrophoretic mobility?	**5**	**1**

PART- B (5 x 13 = 65 Marks)

		Marks	CO	RBT LEVEL
11. (a)	Describe monochromators and filters used in molecular spectroscopy with a neat diagram.	**(14)**	**1**	**3**

(OR)

(b)	Discuss photomultiplier tube and diode array detector in detail with a neat sketch.	**(14)**	**1**	**3**
12. (a)	Differentiate stokes from antistokes. Explain the principle and procedure involved in Raman spectroscopy.	**(14)**	**1**	**4**
	(OR)			
(b)	Derive Beer-Lambert's equation, discuss real, chemical and instrumental deviationsand explain how this equation is helpful in quantitative analysis?	**(14)**	**1**	**4**
13. (a)	Discuss about the different component of a mass spectrometer and the time of flight analyzer with a suitable diagram.	**(14)**	**2**	**3**
	(OR)			
(b)	With a neat sketch, explain the working principles and instrumentation of NMR spectroscopy.	**(14)**	**2**	**3**
14. (a)	Why chromatography is deployed in the later stage of bioseparation process? Briefly describe ion exchange, affinity, and gel permeation chromatography techniques with a suitable diagram.	**(14)**	**3**	**3**
	(OR)			
(b)	Explain the significant features of stationary and mobile phase used in GC with its advantages for the separation of molecules.	**(14)**	**3**	**3**
15. (a)	How is AFM technique useful in surface analysis and biological research?	**(14)**	**4**	**4**
	(OR)			
(b)	A biotechnology company produces a microbial derived protein. Can you suggest suitable electrophoresis technique to isolate the product with suitable figurative representation?	**(14)**	**5**	**4**

PART- C (1 x 10 = 10 Marks)

(Q.No.16 is compulsory)

		Marks	CO	RBT LEVEL
16.	An unknown structured compound is isolated from microbial source. List the analytical methods that can be employed to find the structure of the compound and explain them in sequence.	**(10)**	**2**	**5**

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