25BTU102

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2025
(First Semester)

Branch – **BIOTECHNOLOGY**

ANALYTICAL TECHNIQUES

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	A buffer solution consists of: a) Strong acid and strong base b) Weak acid and its conjugate base c) Strong acid only d) Salt solution only	K1	CO1
	2	A biosensor typically comprises: a) An enzyme and an electrode b) Only an electrode c) Only a biological cell d) None of the above	K2	CO1
2	3	Beer's law states that the intensity of light decreases with respect to a) Concentration b) Distance c) Composition d) Volume	K1	CO2
	4	Which of the following is not a type of Spectroscopy? a) Gamma ray b) X ray c) Nuclear magnetic resonance d) Sound	K2	CO2
3	5	What is the principle of centrifugation? a) Sedimentation principle b) Filtration principle c) Evaporation principle d) Size reduction principle	K1	CO3
	6	The electrophoretic mobility denoted as μ is mathematically expressed as: a) VE b) E/V c) 1/EV d) V/E	K2	CO3
4	7	Chromatography is a physical method that is used to separate and analyze a) Simple mixtures b) Complex mixtures c) Viscous mixtures d) Metals	K1	CO4
	8	Which of the following cannot be used as an adsorbent in Column adsorption chromatography? a) Magnesium oxide b) Silica gel c) Activated alumina d) Potassium permanganate	K2	CO4
5	9	Which of the following substances cannot be emitted by radioactive substances during their decay? a) Protons b) Neutrinos c) Helium nuclei d) Electrons	K1	CO5
	10	Which type of molecules are used for labeling the cellular entities in the autoradiography technique? a) Glycoproteins b) Radioisotopes c) Stereoisomers d) Enantiomers	K2	CO5

Cont...

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.	Explain a short note on – Molarity and Normality.	K3	CO1
		(OR)		
	11.b.	Write a basic Principles and applications of pH Meter.		
2	12.a.	Explain the Beer-Lambert law and its significance	K3	CO2
		(OR)		
	12.b.	Explain the basic principle of Ultraviolet and visible spectroscopy.		
3	13.a.	Write the Basic principles of sedimentation with their types.	K3	CO3
		(OR)		
	13.b.	Discuss Ultra-centrifugation and its significance.		
4	14.a.	Explain Ion-exchange chromatography with applications.	K4	CO4
		(OR)		
	14.b.	Describe the design and working of gas chromatography and explain how it is used in the analysis of volatile substances.		
5	15.a.	Derive the relationship between the half-life and decay constant of a radioactive substance.	K4	CO5
		(OR)		
	15.b.	Discuss radioactivity, Laboratory hazards, and Safety standards.		

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 a detailed account of buffer preparations and their various types.	K1	CO1
2	17	Explain the fundamental principles behind Infrared (IR) spectroscopy and Raman spectroscopy.	K2	CO2
3	18	Discuss various types of centrifugations and their application.	K3	CO3
4	19	Write the basic principles and significance of High-performance liquid chromatography	K4	CO4
5	20	Explain the basic principles of GM and Scintillation counter.	K5	CO5

Z-Z-Z END