

**PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)**

**BSc DEGREE EXAMINATION MAY 2026
(Fourth Semester)**

Branch - **MICROBIOLOGY**

BIOINSTRUMENTATION

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	The device used to select wavelength in a colorimeter is (i) Detector (ii) Filter (iii) Amplifier (iv) Electrode	K1	CO1
	2	In a spectrophotometer, absorbance increases when (i) Concentration decreases (ii) Path length decreases (iii) Concentration increases (iv) Light intensity increases	K2	CO1
2	3	Differential centrifugation separates particles based on differences in (i) Color (ii) Size and density (iii) Temperature (iv) pH	K1	CO2
	4	Increasing the speed of centrifugation generally (i) Decreases sedimentation rate (ii) Increases sedimentation rate (iii) Stops separation (iv) Reduces particle size	K2	CO2
3	5	Gas-Liquid Chromatography (GLC) is mainly used to separate (i) Proteins (ii) Non-volatile compounds (iii) Volatile compounds (iv) Large cells	K1	CO3
	6	HPLC provides better separation compared to column chromatography because of (i) Lower pressure (ii) Manual operation (iii) High pressure and fine particles (iv) Larger particle size	K2	CO3
4	7	Agarose gel electrophoresis is commonly used to separate (i) Lipids (ii) DNA fragments (iii) Sugars (iv) Hormones	K1	CO4
	8	Increasing the voltage during electrophoresis generally (i) Decreases migration rate (ii) Stops separation (iii) Increases migration rate (iv) Prevents band formation	K2	CO4
5	9	What is the main purpose of a quenching agent in a liquid scintillation counter? (i) To increase half-life of the isotope (ii) To reduce background noise (iii) To stabilize the Geiger-Muller tube (iv) To separate isotopes	K1	CO5
	10	In a solid scintillation counter, scintillation occurs due to: (i) Chemical reaction between sample and scintillator (ii) Absorption of radiation energy and emission of light (iii) Radioactive decay of solvent (iv) Electrical discharge in the medium	K2	CO5

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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.	List the components of a UV-Visible spectrophotometer and label them in a neat diagram.	K1	CO1
		(OR)		
	11.b.	Define Beer-Lambert's Law and show its mathematical expression.		
2	12.a.	Outline the differences between analytical and preparative centrifugation.	K2	CO2
		(OR)		
	12.b.	Explain the mechanism of ultracentrifugation and trace the steps involved in separating subcellular components.		
3	13.a.	Apply the principles of paper chromatography to separate a mixture of amino acids and identify the components based on R _f values.	K3	CO3
		(OR)		
	13.b.	Organize a protocol for gel permeation chromatography to separate polymers of different molecular weights		
4	14.a.	Differentiate between agarose gel electrophoresis and polyacrylamide gel electrophoresis with suitable examples.	K4	CO4
		(OR)		
	14.b.	Examine how pH and buffer composition affect the migration of proteins in electrophoresis.		
5	15.a.	Compare Geiger-Muller counter and scintillation counter in terms of principle, sensitivity, and applications.	K4	CO5
		(OR)		
	15.b.	Discover how radioisotopes can be used to study protein turnover in cells and justify the experimental design.		

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	Label the main parts of a colorimeter and explain their function.	K1	CO1
2	17	Extend the use of differential centrifugation to isolate specific cellular components.	K2	CO2
3	18	Experiment with TLC to identify the components of a given plant pigment extract and report the R _f values.	K3	CO3
4	19	Discover how immune electrophoresis can be applied to identify unknown serum proteins.	K4	CO4
5	20	Evaluate the importance of using Iodine-131 in thyroid studies and recommend precautions.	K5	CO5

Z-Z-Z END