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PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2025
(First Semester)

Branch – **ENVIRONMENTAL SCIENCE**

INSTRUMENTATION METHODS FOR ENVIRONMENTAL SAMPLES

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	What is the primary advantage of using microwave digestion over conventional acid digestion? a) Lower operating temperature b) Faster reaction times and reduced contamination c) Increased sample volume capacity d) Greater tolerance for organic matrices	K1	CO1
	2	In an experiment, it is found that the experimental value is very close to actual value, hence the experimental value can be called _____ a) Accurate b) Precise c) Suitable d) Mean	K2	CO1
2	3	Which of the following is a non-dispersive type of spectrophotometer a) Spectrofluorometer b) Spectrophotometer c) Flame photometer d) Fourier transform infrared spectroscopy	K1	CO2
	4	Raman effect is scattering of _____ a) Atoms b) Molecules c) Protons d) Photons	K2	CO2
3	5	A glass membrane electrode is most commonly used for measuring _____ a) Sodium ions b) Chloride ions c) pH (hydrogen ions) d) Calcium ions	K1	CO3
	6	Separation of ions in mass spectrometer takes place based on _____ a) Mass b) Charge c) Molecular weight d) Mass to charge ratio	K2	CO3
4	7	Which of the following instrument is used to measure atmospheric pressure? a) Anemometer b) Thermometer c) Hygrometer d) Barometer	K1	CO4
	8	The principle behind the chemiluminescent method is _____ a) Absorption of light by a sample b) Emission of light from a chemical reaction c) Scattering of light by particles in a solution d) Diffraction of light through a sample	K2	CO4

Cont...

5	9	Data science primarily concerned with _____ a) Analyzing and interpreting data b) Collecting data only c) Storing data in database d) Advance programming only	K1	CO5
	10	In a photomultiplier tube, a cascade of electrons is created by a series of electrodes called ___ a) Anodes b) Photocathode c) Dynodes d) Resistors	K2	CO5

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.	Elaborate on various error minimization techniques and their outcomes in analytical chemistry.	K2	CO1
		(OR)		
	11.b.	Differentiate the liquid-liquid and liquid-solid extractions with suitable examples.		
2	12.a.	Examine the flame photometry principles and its application in alkali and alkaline earth metals assessment in environmental samples.	K3	CO2
		(OR)		
	12.b.	Illustrate UV-visible spectrophotometer instrumentation and application.		
3	13.a.	Investigate the working principle of Bomb calorimeter in calorific value assessment.	K4	CO3
		(OR)		
	13.b.	Analyze the role of electrophoresis techniques for separation of DNA and protein.		
4	14.a.	Compare the turbidimetry and Nephelometry in terms of principle and instrumentation.	K5	CO4
		(OR)		
	14.b.	Appraise the noise assessment using sound level meter.		
5	15.a.	Explain the working mechanism and application of Geiger-Muller counter.	K6	CO5
		(OR)		
	15.b.	Outline the application of the internet of things (IoT) in environmental monitoring and decision-making processes.		

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	Explain various water sampling methods and their application in water quality monitoring.	K2	CO1
2	17	Examine the principle and instrumentation of Atomic Absorption Spectroscopy.	K3	CO2
3	18	Compare the High-performance liquid chromatography and Gas chromatography-mass spectrometry in terms of instrumentation and application.	K4	CO3
4	19	How to measure particulate matter using the Beta attenuation method?	K5	CO4
5	20	Assess the principle and application of carbon dating and its significance.	K5	CO5

Z-Z-Z END