

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

**MSc DEGREE EXAMINATION MAY 2025
(Second Semester)**

Branch - ENVIRONMENTAL SCIENCE

ENVIRONMENTAL BIOTECHNOLOGY AND NANOTECHNOLOGY

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 process of trapping cells in a gel-like substance called? a) Adsorption b) Covalent bonding c) Encapsulation d) Electrical binding	K1	CO1
	2	Show which type of dyes are typically most resistant to biodecoloration. a) Reactive dyes b) Azo dyes c) Acid dyes d) Vat dyes	K2	CO2
2	3	Which microorganism is often used in the bioremediation of oil spills? a) <i>Escherichia.coli</i> b) <i>Pseudomonas putida</i> c) <i>Saccharomyces cerevisiae</i> d) <i>Rhizobium</i>	K1	CO1
	4	Relate which of the following is a key microorganism used in bioleaching? a) <i>Bacillus subtilis</i> b) <i>Pseudomonas fluorescens</i> c) <i>Escherichia coli</i> d) <i>Acidithiobacillus ferrooxidans</i>	K2	CO2
3	5	Choose the biofertilizer that is used in rice cultivation to fix nitrogen. a) Azolla b) Azospirillum c) Rhizobium d) Vesicular Arbuscular Mycorrhiza	K1	CO1
	6	In which year was the TRIPS Agreement, which governs international IPR standards, established? a) 1990 b) 1995 c) 2000 d) 2005	K2	CO1
4	7	What is the typical size range of particles in a colloidal system? a) 1-10 nm b) 10-100 nm c) 100-1000 nm d) Above 1 mm	K1	CO2
	8	Which type of zeolite is most used in the removal of ammonia from wastewater? a) Chabazite b) Faujasite c) Mordenite d) Clinoptilolite	K2	CO2
5	9	Which mechanism primarily drives the adsorption of contaminants onto carbon nanotubes? a) Van der Waals forces b) Chemical bonding c) Covalent interactions d) Gravitational force	K1	CO1
	10	In the context of biomass energy, what is the role of nano-sensors? a) To increase biomass production b) To monitor and optimize conversion processes c) To reduce the cost of biomass feedstock d) To enhance the energy density of biomass	K2	CO1

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.	Construct the mechanisms of biological calcification and how they contribute to carbon sequestration.	K3	CO1
		(OR)		
	11.b.	Build the selection criteria for bioindicators used in wastewater treatment and their relevance to different treatment technologies.		
2	12.a.	Solve how each phytoremediation technique operates and its suitability for specific environmental conditions.	K3	CO2
		(OR)		
	12.b.	Solve with specific examples that demonstrate the practical applications and effectiveness of biopulping.		
3	13.a.	Infer how environmental circumstances affect biofertilizer nitrogen fixation efficiency.	K4	CO3
		(OR)		
	13.b.	Analyze how different biofuel production technologies from the first, second, and third generations affect energy sustainability.		
4	14.a.	Examine how surface chemistry affects nanomaterial characteristics and behavior.	K4	CO4
		(OR)		
	14.b.	Discuss polymeric organosilicon chemical structures and examine how affect mechanical and thermal properties.		
5	15.a.	Assess the role of nanomaterials in water treatment methods.	K5	CO5
		(OR)		
	15.b.	Explain the role of nanotechnology in enhancing solar thermal energy systems.		

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	Examine how international regulatory frameworks like the Cartagena Protocol regulate GMO and LMO usage and dissemination.	K3	CO1
2	17	Discuss the health impacts of pesticide poisoning in Kerala regarding the endosulfan tragedy.	K3	CO2
3	18	Examine the role of the Institutional Biosafety Committee (IBSC) in monitoring and enforcing biosafety regulations.	K4	CO3
4	19	Assess the role of green synthesis methods for nanoparticles in reducing environmental impact.	K4	CO4
5	20	Critically evaluate the advanced nano techniques used in the removal of organic pollutants from wastewater.	K5	CO5

Z-Z-Z

END