

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2024
(Third Semester)

Branch – ENVIRONMENTAL SCIENCE

INDUSTRIAL PROCESS AND ENVIRONMENTAL SAFETY

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	How are industries classified? a) Raw material b) Ownership c) Size d) All the above	K1	CO1
	2	The time and temperature combination in plate pasteurization is a) 63 °C for 30 mins b) 72 °C for 15 secs c) 75 °C for 15mins d) 100 °C for 30 mins	K1	CO1
2	3	Which of the following is a method of dyeing? a) Printing b) Finishing c) Mercerizing d) Batik	K2	CO2
	4	Which of the following processes is commonly used to shape plastic into products like bottles, containers, and toys? a) Injection molding b) Extrusion c) Blow molding d) All of the above	K2	CO2
3	5	What is the most dominant constituent of cement? a) Silica b) Lime c) Magnesia d) Alumina	K1	CO3
	6	Which of the following is a by-product of petroleum refining process? a) Fuel oil b) Diesel oil c) Ammonia d) Lubricating oil	K2	CO3
4	7	Which of the following solid wastes describe the term 'Municipal Solid Waste'? a) Toxic b) Hazardous c) Non-Toxic d) Non-Hazardous	K1	CO4
	8	Which of the following is NOT a recyclable material? a) Paper b) Food c) Plastic d) Metal	K1	CO4
5	9	What is correct for circular economy? a) Circular economy wastes resources. b) Circular economy implies the reduction of waste to a minimum. c) Circular economy promotes recycling again and again. d) Circular economy is a traditional strategy	K2	CO5
	10	Which of the following element make e-waste hazardous in nature? a) Lead b) Glass c) Plastic d) Iron	K1	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.	Analyze the effects of dairy waste water and its treatment techniques.	K4	CO1
		(OR)		
	11.b.	Examine the distillery unit manufacturing Process and discuss the sources of wastewater generation.		
2	12.a.	List the textile industry wastewater characteristics and its treatment methods.	K4	CO2
		(OR)		
	12.b.	Inspect and explain the tanning process in detail.		
3	13.a.	Appraise the stages of electroplating process and explain its wastewater impacts.	K5	CO3
		(OR)		
	13.b.	Evaluate the thermal power plants' environmental impacts and its pollutants control measures.		
4	14.a.	Assess the significance of the waste management approach in industrial pollution control.	K5	CO4
		(OR)		
	14.b.	Criticize the need and procedure of an industrial waste audit.		
5	15.a.	Elaborately discuss the functions of industries legal liaison protocols.	K6	CO5
		(OR)		
	15.b.	Discuss the advantages and challenges of the circular economy in waste management from Indian perspectives.		

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	Analyze the various categorizations of industrial sectors.	K4	CO1
2	17	Inspect the paper production process and its wastewater treatment techniques.	K4	CO2
3	18	Explain the cement industry environmental impacts and its control measures.	K5	CO3
4	19	Assess the fundamentals of zero liquid discharge systems and its significance in water treatment.	K5	CO4
5	20	Discuss the objectives and steps involved in LCA analysis.	K6	CO5

Z-Z-Z

END

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

**MSc DEGREE EXAMINATION DECEMBER 2024
(Third Semester)**

Branch- **ENVIRONMENTAL SCIENCE**

CLIMATE CHANGES AND MANAGEMENT

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(10 × 1 = 10)

Question No.	Question	K Level	CO
1	United Nations Framework Convention on Climate Change aims to a) Reduce global warming only b) Reduce pollution c) Reduce climate change only d) Reduce both A & C	K1	CO1
2	How climate change leads to conflicts in vulnerable regions? a) By shortage of human resources b) By shortage of food and water c) By shortage of land d) By shortage of chemical manures	K2	CO1
3	Which sector is the largest contributor to greenhouse gas emissions worldwide? a) Transportation b) Agriculture c) Energy production d) Industrial processes	K1	CO1
4	Which of the following greenhouse gases is produced primarily by agricultural activities? a) Methane (CH ₄) b) Ozone (O ₃) c) Carbon dioxide (CO ₂) d) Sulfur hexafluoride (SF ₆)	K2	CO2
5	Which of the following is a mitigation measure to reduce greenhouse gas emissions? a) Building flood barriers b) Implementing energy-efficient technologies c) Relocating communities from coastal areas d) Constructing drought-resistant crops	K1	CO2
6	What is a key mitigation strategy in the transportation sector to reduce greenhouse gas emissions? a) Promoting carpooling and public transit b) Constructing hurricane shelters c) Building seawalls in flood-prone areas d) Developing early warning systems for natural disasters	K2	CO2
7	Which environmental factor contributes to increased disaster risk in coastal areas? a) Deforestation b) Urbanization c) Rising sea levels due to climate change d) Agricultural expansion	K1	CO3
8	Which of the following is a major consequence of climate change that increases the likelihood of environmental disasters? a) Improved air quality b) Increased frequency of extreme weather events c) Stable sea levels d) Reduced natural hazards	K2	CO3
9	Which of the following is a key mitigation measure for reducing the impact of earthquakes? a) Developing early warning systems for tsunamis b) Constructing earthquake-resistant buildings c) Evacuating residents during an earthquake d) Relocating residents after an earthquake	K1	CO4
10	The installation of early warning systems for disasters like hurricanes and tsunamis is an example of: a) Mitigation b) Adaptation c) Response d) Recovery	K2	CO4

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SECTION - B (35 Marks)Answer **ALL** questions**ALL** questions carry **EQUAL** Marks

(5 × 7 = 35)

Question No.	Question	K Level	CO
11.a.	Explain the importance of barometers in weather prediction.	K2	CO1
	(OR)		
11.b.	Explain the role of the sun in regulating Earth's climate.		
12.a.	Discuss the role of the burning of coal, oil, and natural gas to greenhouse gas emissions.	K3	CO1
	(OR)		
12.b.	Sustainable farming practices reduce greenhouse gas emissions in agriculture Explain.		
13.a.	Compare electric vehicles (EVs) and traditional combustion engine vehicles in terms of GHG emissions.	K3	CO2
	(OR)		
13.b.	Propose methods to mitigate emissions in high-impact cement industries.		
14.a.	Analyze the interrelationship between environmental degradation and the increased frequency of natural disasters in vulnerable regions.	K4	CO3
	(OR)		
14.b.	Compare the disaster response and recovery processes for different types of human-made disasters.		
15.a.	Examine the influence of cultural factors on disaster adaptation strategies.	K4	CO4
	(OR)		
15.b.	Analyze the role of non-governmental organizations (NGOs) in promoting adaptation and mitigation strategies in disaster-prone areas.		

SECTION -C (30 Marks)Answer **ANY THREE** questions**ALL** questions carry **EQUAL** Marks

(3 × 10 = 30)

Question No.	Question	K Level	CO
16	Discuss how El Niño influences the climate of the Indian Ocean region?	K6	CO1
17	Explain the concept of "carbon footprint" and how different sectors contribute to it?	K5	CO1
18	Explain the role of afforestation and reforestation in mitigating greenhouse gas emissions.	K5	CO2
19	Evaluate the effectiveness of early warning systems in mitigating the impacts of disasters.	K4	CO3
20	List some common natural disasters in your region, and what specific measures can be taken to mitigate their impact?	K4	CO4

Z-Z-Z

END

(AUTONOMOUS)

(Third Semester)

Branch – **ENVIRONMENTAL SCIENCE**

REMOTE SENSING & GIS IN ENVIRONMENTAL MANAGEMENT

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry **EQUAL** marks

$$(10 \times 1 = 10)$$

Question No.	Question	K Level	CO
1	What is the term used to describe the process of converting three-dimensional geographic coordinates into a two-dimensional map? a) Geocoding b) Map Projection c) Geospatial analysis d) Cartography	K1	CO1
2	Which of the following types of maps shows physical terrain features such as mountains, rivers, and valleys? a) Political map b) Road map c) Physical map d) Cadastral map	K2	CO1
3	A common limitation of remote sensing is _____ a) Its inability to detect changes in land use b) The high cost of data acquisition c) The reliance on ground-based observations d) Its inability to capture satellite imagery at night	K1	CO2
4	The unique pattern of reflected EMR of any object is called as _____ a) Atmospheric window b) Absorption maxima c) Spectral resolution d) Spectral signature	K2	CO2
5	In photogrammetry, stereoscopic viewing helps in _____ a) Creating panoramic images b) Measuring vertical distances and terrain elevations c) Determining color variations d) Estimating the temperature of objects	K1	CO3
6	Hyperspectral remote sensing is performed using _____ satellite system. a) HySIS b) HyperSAT c) HSAT d) RISAT	K2	CO3
7	Which of the following is NOT a component of a GIS system? a) Hardware b) Data c) Energy source d) Software	K1	CO2
8	GPS is a system primarily used for _____ a) Mapping weather patterns b) Navigation and location tracking c) Identifying land cover types d) Analyzing soil moisture content	K2	CO2
9	In disaster management, which remote sensing technique is particularly useful for monitoring volcanic eruptions and ash plumes? a) LiDAR b) Infrared thermal imaging c) Hyperspectral imaging d) Synthetic Aperture Radar (SAR)	K1	CO3
10	Remote sensing is particularly useful for monitoring which type of natural disaster? a) Tornadoes b) Volcanic eruptions c) Tsunamis and floods d) Power outages	K2	CO3

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SECTION - B (35 Marks)Answer **ALL** questions**ALL** questions carry **EQUAL** Marks (5 × 7 = 35)

Question No.	Question	K Level	CO
11.a.	Classify the types of maps with brief description.	K4	CO1
	(OR)		
11.b.	Categorize the projection systems.		
12.a.	Examine the principles of an ideal remote sensing system.	K5	CO2
	(OR)		
12.b.	Assess the different aspects of energy interactions in the atmosphere.		
13.a.	Distinguish different kinds of aerial photographs.	K4	CO2
	(OR)		
13.b.	Analyse the basics of photogrammetry.		
14.a.	Explain the steps involved in digital image processing.	K5	CO3
	(OR)		
14.b.	Interpret the applications of change detection analysis using Normalized Difference Vegetation Index.		
15.a.	How will you create an integrated system for watershed management using RS & GIS?	K6	CO3
	(OR)		
15.b.	Discuss the application of RS & GIS in wildlife corridor mapping and habitat analysis.		

SECTION - C (30 Marks)Answer **ANY THREE** questions**ALL** questions carry **EQUAL** Marks (3 × 10 = 30)

Question No.	Question	K Level	CO
16	Inspect the elements of map.	K4	CO1
17	Classify the types of remote sensing with discussions on their advantages and limitations.	K4	CO2
18	Evaluate the different types of platforms and sensors used in remote sensing.	K5	CO2
19	Critically assess the coordinate systems and projections in GIS.	K5	CO3
20	Discuss in detail about the utilisation of RS & GIS in land use land cover change detection.	K6	CO3

Z-Z-Z

END

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(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2024
(Third Semester)

Branch – ENVIRONMENTAL SCIENCE

MAJOR ELECTIVE COURSE – I ENVIRONMENTAL ENGINEERING

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(10 × 1 = 10)

Question No.	Question	K Level	CO
1	The physical process used in wastewater treatment. a) Coagulation b) Biological oxidation c) Screening d) Chlorination	K1	CO1
2	Which of the following factors significantly affects the performance of a sedimentation tank? a) Influent temperature b) Shape of the tank c) Water hardness d) Time of the day	K2	CO1
3	In a fixed aerobic treatment process, microorganisms grow _____ a) Suspended in the water column b) On solid media like rocks or plastic surfaces c) In sealed anaerobic tanks d) On the surface of aerators	K1	CO2
4	Mean Cell Residence Time (MCRT) in the activated sludge process refers to _____ a) The average time microorganisms spend in the aeration tank b) The amount of time required to treat one batch of wastewater c) The contact time of sludge in the clarifier d) The turnover rate of air in the aeration tank	K2	CO2
5	The optimal temperature range for mesophilic anaerobic digestion is _____ a) 15-20°C b) 25-40°C c) 35-40°C d) 50-60°C	K1	CO3
6	The anaerobic reactor system specifically designed to handle wastewater with high organic loads and is used for efficient biogas production is _____ a) Conventional aeration system b) Sequencing Batch Reactor (SBR) c) Upflow Anaerobic Sludge Blanket Reactor (UASBR) d) Moving Bed Biofilm Reactor (MBBR)	K2	CO3
7	A water softener is primarily designed to remove _____ a) Organic matter b) Suspended solids c) Hardness-causing ions such as calcium and magnesium d) Bacteria and viruses	K1	CO2
8	What is the main difference between a rapid sand filter and a slow sand filter? a) Rapid sand filters use biological processes, while slow sand filters do not b) Slow sand filters operate under pressure c) Slow sand filters use dual media for filtration d) Rapid sand filters have a faster filtration rate and require frequent backwashing	K2	CO2

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9	Air filter with ability to remove very fine particles (0.3 microns or larger) with 99.97% efficiency is _____ a) HEPA filter b) Cyclone separator c) Wet scrubber d) Settling chamber	K1	CO3
10	The design of a Regenerative Thermal Oxidizer (RTO) focuses on _____ a) Capturing fine particulate matter b) Maximizing heat recovery while oxidizing volatile organic compounds (VOCs) c) Removing sulfur dioxide from flue gases d) Reducing noise pollution	K2	CO3

SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry **EQUAL** Marks

$$(5 \times 7 = 35)$$

Question No.	Question	K Level	CO
11.a.	Categorise different types of sedimentation tanks.	K4	CO1
	(OR)		
11.b.	Distinguish between unit operations and unit processes.		
12.a.	Determine the influencing factors in aerobic treatment process.	K5	CO2
	(OR)		
12.b.	Explain the factors influencing the efficiency of activated sludge process.		
13.a.	Inspect the principle and designing aspects of septic tank.	K4	CO2
	(OR)		
13.b.	Compare and contrast MBR and MBBR.		
14.a.	Discuss the fouling control measures in reverse osmosis.	K5	CO3
	(OR)		
14.b.	Evaluate the application of defoaming and antifoam agents in water treatment.		
15.a.	How will you adapt electrostatic precipitators (ESP) in air pollution management?	K6	CO3
	(OR)		
15.b.	Develop strategies for noise control measures.		

SECTION -C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry EQUAL Marks (3 × 10 = 30)

Question No.	Question	K Level	CO
16	Evaluate the concept of coagulation, types and optimum dosage in waste water treatment.	K5	CO1
17	Examine the various types of aerators in waste water treatment.	K4	CO2
18	Assess the factors influencing the process efficiency of anaerobic digesters.	K5	CO2
19	Inspect the principles and applications of different types of disinfection techniques.	K4	CO3
20	Elaborate the air pollution control measures in detail.	K6	CO3

Z-Z-Z

END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2024
(First Semester)

Branch- ENVIRONMENTAL SCIENCE

ECOLOGY AND SUSTAINABLE DEVELOPMENT

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	Which of the following requires maximum energy? (a) Secondary consumer (b) Decomposer (c) Primary consumer (d) Primary producer	K1	CO1
	2	In an ecosystem, the energy flow is always (a) Always unidirectional (b) Always bidirectional (c) In any direction (d) Always down directional	K2	CO1
2	3	Which of the following is not a feature of 'r' selected species? (a) Reproduce quickly (b) The low survival rate of progenies (c) Reproduce a large number of progenies (d) Paternal care	K1	CO2
	4	Which of the following orders of basic processes are involved in succession? (a) Invasion - stabilization - completion and coaction - reaction - nudation (b) Nudation - stabilization - completion and coaction - invasion - reaction (c) Invasion - nudation - completion and coaction - reaction - stabilization (d) Nudation - invasion - completion and coaction - reaction - stabilization	K2	CO2
3	5	For documenting rare and endangered species of animals and plants what is established? (a) Green data Book (b) Blue data book (c) Red data book (d) Census data book	K1	CO3
	6	Which two biomes are the most similar with regard to rainfall? (a) Tundra and taiga (b) Tundra and desert (c) Rain forest and savanna (d) Temperate forest and prairie	K2	CO3
4	7	Which of the following statement is correct about Sustainable agriculture? (a) It focuses on producing long-term crops and livestock without harming the environment. (b) It is a techniques and method that protect the environment, public health, human communities and animal welfare while producing food, fibre, or plant or animal products. (c) Both (a) & (b) (d) Only (a)	K1	CO4
	8	The progress on Sustainable development goals (SDGs) is monitored by NITI Aayog using which index? (a) SDG Development index (b) SDG NITI index (c) SDG India index (d) SDG Progress index	K2	CO4

Cont...

5	9	What was the name of the valley in which the Chipko movement began? (a) Alakananda valley (b) Narmada valley (c) Appiko valley (d) Silent valley	K1	CO5
	10	The Sustainable Development Goals comprises of how many goals and targets? (a) 17 goals and 132 targets (b) 17 goals and 169 targets (c) 15 goals and 123 targets (d) 17 goals and 164 targets	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.	Identify the biotic and abiotic components of an aquatic ecosystem.	K3	CO1
		(OR)		
	11.b.	How to apply the concept of the ecological footprint in the ecosystem management?		
2	12.a.	Organize the difference between allelopathy and parasitism.	K3	CO2
		(OR)		
	12.b.	Construct the impacts of biological invasion on native community.		
3	13.a.	Inspect the unique characteristics of Shola forest.	K4	CO3
		(OR)		
	13.b.	Examine the in-vitro biodiversity conservation techniques and its significance.		
4	14.a.	List out and explain the indicators of sustainable development.	K4	CO4
		(OR)		
	14.b.	Analyze the significance of Sustainable rural and urban planning.		
5	15.a.	Appraise the 5 P's of sustainable development goals.	K5	CO5
		(OR)		
	15.b.	Assess the role of the Save Silent Valley movement in protecting the forest ecosystem.		

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	Analyze the gaseous biogeochemical cycles and its function in the ecosystem.	K4	CO1
2	17	Inspect the concept of Ecological equivalents and ecological indicators with an example.	K4	CO2
3	18	Examine the Ecosystem services and its importance.	K4	CO3
4	19	Evaluate the merits of sustainable agriculture over conventional agriculture practices with an example.	K5	CO4
5	20	Evaluate the necessity of saving the Sundarbans movement.	K5	CO5

Z-Z-Z END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2024
(First Semester)

Branch- ENVIRONMENTAL SCIENCE

AIR POLLUTION AND MANAGEMENT

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	Choose the sphere where most weather effects that are experienced on Earth. a) Stratosphere b) Mesosphere c) Troposphere d) Exosphere	K1	CO1
	2	Find Richardson number where vertical mixing in winds disappear. a)1 b)0.25 c)0.5 d) 0.75	K2	CO1
2	3	Which of the following is a secondary air pollutant? a) SPM b) PAN c) SO ₂ d) NO ₂	K1	CO2
	4	Which air pollutant cause corrosion of building? a) SO ₂ b) SO ₃ c) CO d) NO ₂	K2	CO2
3	5	What range of air quality index has the most severe impact on human health? a) 101-200 b) 201-300 c) 301-400 d) 401-500	K1	CO3
	6	What is the annual carbon monoxide concentration allowances set by the Indian air quality standards for sensitive areas? a) 1000 µg/m ³ b) 2000 µg/m ³ c) 4000 µg/m ³ d) 5000 µg/m ³	K2	CO3
4	7	What is the upper limit of particulate sizes released from industries? a) 1 µm b) 100 µm c) 50 µm d) 10 µm	K1	CO4
	8	Which biomass is a component of Pusa consortium? a) algal b) fungal c) bacterial d) Viral	K2	CO4
5	9	What does the blue smoke in diesel engine indicate? a) Unburnt oil b) HC c) NO _x d) CO	K1	CO5
	10	Infer the lateral dispersion coefficient basis in Gaussian plume model. a) Atmospheric stability b) Downward distance c) Only (a) d) Both (a) and (b)	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.	Build the scales of measurement of meteorological parameters.	K3	CO1
	(OR)			
	11.b.	Construct atmospheric dispersion processes.		
2	12.a.	Discover sources, types and control of indoor air pollutants.	K4	CO2
	(OR)			
	12.b.	Classify gaseous Pollutants.		
3	13.a.	Develop sampling and monitoring techniques of air pollutants with respect to period, frequency and duration.	K3	CO3
	(OR)			
	13.b.	Build air quality standards based on WHO.		
4	14.a.	Examine particulate matter control methods.	K4	CO4
	(OR)			
	14.b.	Examine a case study on biofuels.		
5	15.a.	Evaluate engine parameters to be monitored for air pollution control.	K5	CO5
	(OR)			
	15.b.	Justify the e-vehicles and hybrid vehicles and their significance in terms of reducing air pollution.		

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	Analyze the structure and composition of atmosphere.	K4	CO1
2	17	Examine global implications of air pollution.	K4	CO2
3	18	Conclude noise pollution, its measurement and control methods.	K5	CO3
4	19	Discover how particulate matters in stack gas are controlled through different techniques?	K4	CO4
5	20	Assess air pollution models.	K5	CO5

Z-Z-Z END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
MSc DEGREE EXAMINATION DECEMEER 2024
(First Semester)

Branch- **ENVIRONMENTAL SCIENCE**

ENERGY RESOURCES AND CONSERVATION

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 most widely accepted definition of a natural resource is ____ (a) A resource that cannot be replenished (b) A material created by humans for industrial use (c) A resource created by technological processes (d) A material or substance occurring in nature which can be used for economic gain	K1	CO1
	2	Land resources are conserved by the following methods (i) Afforestation (ii) Over grazing (iii) Regulating pesticides and fertilizers for agriculture (iv) Desertification. Choose the correct pair. (a) (i) only (b) (i), (ii) and (iii) (c) (i) and (iii) only (d) (i), (ii) and (iii)	K2	CO1
2	3	Heat transfer due to bulk movement of molecules within fluids is called as (a) Conduction (b) Convection (c) Radiation (d) Convention	K1	CO2
	4	Earth's energy budget describes the (a) Absorption of Solar Radiation by Atmosphere (b) Absorption of Solar Radiation at Earth's Surface (c) balance between the radiant energy that reaches Earth from the sun and the energy that flows from Earth back out to space (d) Infrared Radiation Emitted from Earth's Surface to Space	K2	CO2
3	5	_____ is the most common nuclear reactor type and currently makes up around 70% of nuclear reactor fleet in the world. (a) Boiling Water Reactors (b) Pressurized Water Reactors (c) Small Modular Reactor (d) Pressurized heavy water reactors	K1	CO3
	6	Which of the following energy resource is correctly matched with its correct energy value? Energy Source Energy Value (i) Sub Bituminous Coal 17.4-23.9 MJ/kg (ii) LPG 16 MJ/kg (iii) Natural gas 500 GJ/kg (iv) Uranium 50-55 MJ/kg (a) (i) only (b) (i) and (ii) (c) (i),(ii) and (iii) (d) None	K2	CO3
4	7	The simplest and fastest type of energy audit is called as (a) walk-through energy audit (b) target energy audit (c) detailed energy audits (d) None of these	K2	CO4
	8	Which of the following is a key feature of green building design? (a) Maximum use of non-renewable energy resources (b) Minimizing the energy efficiency (c) Minimizing environmental impacts (d) Design and maximizing the cost for interior	K1	CO4
5	9	_____ number of new initiatives are covered under the National Mission for Enhanced Energy Efficiency (NMEEE). (a) 2 (b) 3 (c) 4 (d) 6	K1	CO5

Cont...

5	10	The main objective of the IREDA is (a) To provide energy for specific projects and schemes (b) To give financial support to specific projects and schemes for generating electricity (c) To promote measures to accelerate conservation of petroleum products (d) To provide petroleum products for industrial projects and schemes	K2	CO5
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SECTION - B (35 Marks)Answer **ALL** questions**ALL** questions carry **EQUAL** Marks (5 × 7 = 35)

ALL questions carry EQUAL Marks (3 × 7 = 21)				
Module No.	Question No.	Question	K Level	CO
1	11.a.	Analyze the factors influencing the availability and distribution of natural resources.	K4	CO1
	(OR)			
	11.b.	Evaluate the challenges associated with the overutilization of surface and groundwater resources.		
2	12.a.	Define and explain mass and energy transfer across interfaces, and their applications in energy systems.	K3	CO2
	(OR)			
	12.b.	Summarize the Indian energy scenario with sector wise consumption needs.		
3	13.a.	Describe the principles of nuclear energy generation. How do nuclear reactors work, and what are the environmental concerns with nuclear waste?	K5	CO3
	(OR)			
	13.b.	Discuss the principles and applications of geothermal energy. What are the advantages and limitations of harnessing this energy?		
4	14.a.	Analyze the need for an energy audit and categorize the types of energy audits commonly conducted in industries.	K4	CO4
	(OR)			
	14.b.	Compare different types of lighting fixtures (CFL, LED, Halogen, Metal Halide) and their energy-saving potential.		
5	15.a.	Explain the significance of the Energy Conservation Building Code (ECBC) and its impact on energy consumption in buildings.	K5	CO5
	(OR)			
	15.b.	Examine the impact of international initiatives like the International Solar Alliance (ISA) on global energy conservation efforts.		

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	Categorize the different forest resources and its future demand with reference to the Indian scenario.	K4	CO1
2	17	Discuss Earth's energy budget and the significance of the balance between incoming and outgoing energy.	K5	CO2
3	18	Discuss the physico-chemical characteristics, energy content and environmental impacts of fossil fuels such as coal, petroleum, and natural gas.	K4	CO3
4	19	Explain the role of energy managers in industries, and how do energy monitoring, auditing, and targeting contribute to sustainable energy management?	K5	CO4
5	20	Elaborate on the Perform, Achieve, and Trade (PAT) scheme and its role in industrial energy efficiency in India.	K6	CO5

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2024
(First Semester)

Branch- ENVIRONMENTAL SCIENCE

ENVIRONMENTAL TOXICOLOGY AND HEALTH

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(10 × 1 = 10)

Question No.	Question	K Level	CO
1	In toxicology, which term describes substances that are foreign to the body and can cause harmful effects? a) Endobiotics b) Xenobiotics c) Metabolites d) Toxoids	K1	CO2
2	Which of the following is a characteristic of chronic toxicity? a) Symptoms appear immediately after exposure b) Effects are usually reversible c) Effects develop after prolonged exposure d) It occurs only in high doses	K2	CO3
3	Which of the following pesticides is known for its persistent nature in the environment due to its lipid solubility? a) Organochlorine pesticides b) Organophosphates c) Carbamates d) Synthetic pyrethroids	K1	CO3
4	Which organic chemical is recognized as a potent endocrine disruptor commonly found in plastics? a) PCBs b) Phthalates c) Dioxins d) Organochlorines	K2	CO3
5	Which of the following describes a situation where the combined effect of two chemicals is greater than the sum of their individual effects? a) Antagonism b) Synergism c) Additive interaction d) Potentiation	K1	CO2
6	Which testing method is primarily used to determine the toxicity of wastewater effluents? a) Fish Toxicity Test b) Whole Effluent Toxicity (WET) Test c) Toxicity Characteristic Leaching Procedure (TCLP) d) Chronic Toxicity Test	K2	CO4
7	Which heavy metal exposure is primarily associated with siderosis, a condition affecting the lungs? a) Lead b) Cadmium c) Iron d) Mercury	K1	CO1
8	Nephrotoxicity primarily affects which of the following organs? a) Liver b) Heart c) Kidneys d) Lungs	K2	CO1
9	Which of the following detoxification mechanisms involves the conjugation of toxins to water-soluble compounds? a) Phase I reactions b) Phase II reactions c) Phase III reactions d) Bioaccumulation	K1	CO4
10	The WHO's environmental health framework includes which of the following components? a) Policy development b) Epidemiological studies c) Environmental monitoring d) All of the above	K2	CO5

Cont...

SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks (5 × 7 = 35)

Question No.	Question	K Level	CO
11.a.	Explain toxicology and describe its main branches.	K2	CO3
	(OR)		
11.b.	Illustrate the 'spectrum of undesired effects' in toxicology.		
12.a.	Construct a table of major classes of organic pesticides and their effects on the environment.	K3	CO2
	(OR)		
12.b.	Identify the fate and transport of toxicants in ecosystems and the environment.		
13.a.	Inspect bioassay in the context of toxicity evaluation.	K3	CO4
	(OR)		
13.b.	Examine the concept of dose-response relationships in toxicology.		
14.a.	List out the common causes of Hepatotoxicity.	K4	CO1
	(OR)		
14.b.	Conclude occupational health hazard.		
15.a.	Categorize the major Environmental health Agencies in India and its key functions.	K4	CO5
	(OR)		
15.b.	Discover the mechanism behind detoxification of toxins.		

SECTION -C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks (3 × 10 = 30)

Question No.	Question	K Level	CO
16	List out the principles of descriptive animal toxicity tests in toxicology.	K4	CO4
17	Inspect the toxicity of heavy metals and metalloids in the environment.	K4	CO3
18	Classify the types of chemical interactions and their effects in toxicology.	K4	CO2
19	Examine, How does the World Health Organization (WHO) contribute to occupational health?	K4	CO1
20	Analyze the stages of risk assessment and management in toxicological studies.	K4	CO5

Z-Z-Z END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
MSc DEGREE EXAMINATION DECEMBER 2024
(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

$$(10 \times 1 = 10)$$

Module No.	Question No.	Question	K Level	CO
1	1	Systematic errors can be removed for an instrument by a) replacing b) re-calibrating c) repairing d) not using	K1	CO1
	2	Electron Microscope can give a magnification up to _____ a) 400,000X b) 100,000X c) 15000X d) 100X	K2	CO1
2	3	The electroanalytical technique that involves the measurement of electricity consumed in a redox reaction of the analyte is a) Potentiometry b) Gravimetry c) Voltammetry d) Coulometry	K1	CO2
	4	-----sampling method does not test the quality before or after the sampling. a) Grab b) Random c) Composite d) Flow Weighted Composite	K2	CO2
3	5	In which state of matter mass spectroscopy is being performed? a) solid b) liquid c) gaseous d) plasma	K1	CO3
	6	-----method is used for the continuous monitoring of emission concentrations of particulate matter. a) Electrochemical b) Flame ionization c) Piezo electric monitor d) IR spectrophotometry	K2	CO3
4	7	In Thin layer chromatography, the stationary phase is made of _____ and the mobile phase is made of _____ a) Solid, liquid b) Liquid, liquid c) Liquid, gas d) Solid, gas	K1	CO4
	8	Which method is used most commonly for the detection of nitrogen oxides? a) Colorimetry b) Iodometry c) Turbidimetry d) Conductometry	K2	CO4
5	9	What is the half-time of a radioactive sample (in minutes), if its mean life is 200 s? a) 0.69 min b) 2 min c) 2.57 min d) 2.31 min	K1	CO5
	10	Which of the following acts as ionizing gas in Geiger Muller counter? a) Alcohol b) Argon gas c) Krypton d) Hydrogen	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.	Comment on liquid - liquid extraction process in brief.	K3	CO1
		(OR)		
	11.b.	Explain the optical principles of microscopy.		
2	12.a.	Give a brief account on pH meter and the types of electrodes involved in it.	K4	CO2
		(OR)		
	12.b.	Comment on different types of air samplers.		
3	13.a.	Describe the basic principle and instrumentation of Flame photometer.	K3	CO3
		(OR)		
	13.b.	Comment on XRD and its applications.		
4	14.a.	Give a brief account on meteorological equipments.	K4	CO4
		(OR)		
	14.b.	Explain the principles involved in paper, thin layer and ion exchange chromatography.		
5	15.a.	Give a brief account on elemental analyzer and TOC analyzer.	K5	CO5
		(OR)		
	15.b.	Explain about radioactive decay.		

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 the principle, instrumentation and applications of SEM and TEM.	K4	CO1
2	17	Give a detailed account on Multichannel electrochemical work station.	K4	CO2
3	18	Summarize the Continuous Air Monitoring Analysis Methods.	K5	CO3
4	19	Discuss on the instrumentation and applications of GC MS.	K4	CO4
5	20	Explain in detail about Carbon Dating and Radioactive Labeling.	K5	CO5

Z-Z-Z END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMEBR 2024
(Second Semester)

Branch- ENVIRONMENTAL SCIENCE

SOIL POLLUTION AND MANAGEMENT

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 called for the matured soils which are arranged in a series of zones? a) Soil zones b) Soil layers c) Soil horizons d) Soil benches	K1	CO1
	2	What is the process by which minerals are leached downward through the soil profile? a). Translocation b). Illuviation c). Leaching d). Eluviation	K2	CO2
2	3	Which agricultural practice is likely to contribute to nutrient-related soil pollution? a). Crop rotation b). Organic farming c). Excessive fertilizer use d). Agroforestry	K1	CO1
	4	Which soil organism plays a key role in the decomposition of organic matter? a). Fungi b). Nematodes c). Earthworms d). Algae	K2	CO2
3	5	Which soil edaphic factor influences the ability of soil to retain and exchange cations? a). Soil texture b). Soil pH c). Cation exchange capacity (CEC) d). Soil moisture	K1	CO1
	6	What does Hue denotes: a). Dominant spectrum b). Lightness or brightness c). Purity d). Intensity	K2	CO2
4	7	Which laboratory technique is commonly used for total nitrogen analysis in soil? a). Gravimetry b). Spectrophotometry c). Gas Chromatography d). Kjeldahl digestion	K1	CO1
	8	What does soil available nutrient analysis assess? a). Total nutrient content b). Nutrient availability for plant uptake c). Organic matter decomposition d). Soil microbial activity	K2	CO2
5	9	Which is not a type of erosion? a). Splash erosion b). Sheet erosion c). Rill erosion d). Soft erosion	K1	CO1
	10	Which agricultural practice is considered a form of soil conservation to prevent erosion on sloping land? a). Monoculture b). Contour plowing c). Overgrazing d). Conventional tillage	K2	CO2

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 the formation of core, mantle and crust.	K4	CO1
	(OR)			
	11.b.	Demonstrate the impact of plate tectonic activity on landform formation.		
2	12.a.	Illustrate how the factors such as slope, aspect, and drainage contribute to the variation in soils within a landscape?	K4	CO2
	(OR)			
	12.b.	Analyze the specific pollutants released by industrial activities into the soil.		
3	13.a.	Illustrate the role of soil physical properties in enriching soil quality.	K4	CO3
	(OR)			
	13.b.	Explain the key principles of the Diffuse Double Layer theory in soil science and discuss its significance		
4	14.a.	Critically assess the impact of soil sampling depth variability on the representativeness of collected samples.	K4	CO4
	(OR)			
	14.b.	Investigate the advancements in spectroscopic and imaging technologies for total nutrient analysis.		
5	15.a.	Explain briefly about the soil resistance, resilience and erosion.	K4	CO5
	(OR)			
	15.b.	Compare the effectiveness of phytoremediation and bioremediation in addressing soil organic pollution.		

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 in detail the partition of elements during surficial geological process and how it is recycled.	K5	CO1
2	17	Assess the interaction and impact of industrial effluent containing heavy metals and acids on soil quality.	K5	CO2
3	18	Elaborate soil sodicity using Sodium Absorption Ratio (SAR). How does SAR affect soil structure and permeability?	K6	CO3
4	19	Evaluate the concepts of nutrient availability in soil	K5	CO4
5	20	Recommend the conservation techniques for preventing soil erosion.	K5	CO5

Z-Z-Z END

PSG COLLEGE OF ARTS AND SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2024
(Second Semester)

Branch – ENVIRONMENTAL SCIENCE

**ENVIRONMENTAL IMPACT ASSESSMENT AND
ENVIRONMENTAL MANAGEMENT SYSTEM**

Time: Three Hours

Maximum: 75 Marks

SECTION – A (10 Marks)

Answer ALL Questions

ALL Questions carry EQUAL marks

(10 x 1 = 10)

1	Projects exempted from public hearing				K2	CO1
	a	Widening of highways	b	Modernization of Irrigation projects		
	c	Special Economic Zones	d	All the above		
2	In which year EIA was started in India?				K1	CO1
	a	1988	b	1978		
	c	1987	d	1996		
3	There are many known shortcomings in EIA reports. Which is NOT a known shortcoming?				K2	CO2
	a	Appropriate mitigating measures are not considered	b	The description of the proposal does not cover key features		
	c	All relevant stakeholder's concerns are incorporated	d	Insufficient or outdated prediction models are used		
4	The EIA report of a hydropower project would be valid up to how many years after the environmental clearance of the project?				K1	CO2
	a	10 years	b	15 years		
	c	20 years	d	30 years		
5	Checklist approach disadvantage is				K2	CO3
	a	Bad for site selection	b	Hard to understand and use		
	c	Do not link action and impact	d	Bad for priority setting		
6	Which of the following are reasons why conventional microeconomic principles cannot be used to study the allocation of environmental and natural resources?				K2	CO4
	a	Conventional economics is static, generally neglecting future implications of investment decisions				
	b	Many decisions about environmental and natural resources are irreversible				
	c	Environmental and natural resources are often public goods, not subject to the exclusion principle				
	d	All of the above				
7	Environmental auditing is related with				K1	CO4
	a	ISO 14010	b	ISO 14020		
	c	ISO 14050	d	ISO 14060		
8	Life Cycle Assessment (LCA) does not include				K2	CO5
	a	Life Cycle Inventory of the product	b	Emergency Preparedness Plan		
	c	Quantitative Improvement in the process of the product	d	Life Cycle Impact Analysis		
9	In which year did the ISO create the ISO 14000 family of standards?				K1	CO5
	a	1956	b	1966		
	c	1996	d	2006		
10	Which is not a characteristic of corporate social responsibility?				K2	CO5
	a	Product safety	b	Price-fixing		
	c	Consumer rights	d	Environmental policies		

Cont...

SECTION – B (35 Marks)

Answer ALL Questions

ALL Questions carry EQUAL marks

(5 x 7 = 35)

11	a	Categorize the different types of EIA.	K4	CO1
		OR		
	b	Dissect the merits and demerits of EIA.		
12	a	Assess link between the Terms of Reference and the review of the EIA report.	K5	CO2
		OR		
	b	Explain the significance of baseline data in EIA studies.		
13	a	Cost Benefit Analysis continues to be key arbiter of environmental impacts – Justify.	K5	CO4
		OR		
	b	Examine the various factors of production and their significance to economics.		
14	a	Explain the site assessment and liability auditing.	K5	CO5
		OR		
	b	Analyze the limitations of Life Cycle Assessment (LCA).		
15	a	List out the benefits of Environmental Management System.	K4	CO5
		OR		
	b	Compare the salient features of ISO 14000 and ISO 14001 in EMS.		

SECTION – C (30 Marks)

Answer any THREE Questions

ALL Questions carry EQUAL marks

(3 x 10 = 30)

16	Explain the various challenges involved in implementation of EIA.	K5	CO2
17	EIA as an integral part of the planning process – Justify.	K5	CO1
18	Compare the salient features of matrix and network methods in EIA.	K5	CO3
19	Explain the three different phases of environmental auditing.	K5	CO4
20	Prove the benefits of CSR activities in environmental sustainability with a case study in India.	K5	CO5

Z-Z-Z

END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2024
(Second Semester)

Branch- ENVIRONMENTAL SCIENCE

INTEGRATED WASTE MANAGEMENT

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	Find the proportion of municipal solid waste that typically consists of organic materials like food and yard trimmings a) 10-20% b) 30-40% c) 50-60% d) 70-80%	K1	CO1
	2	Choose the primary purpose of transfer stations in the transportation of municipal solid waste? a) To burn waste before disposal b) To store waste before it is transported to a landfill or recycling center c) To incinerate all waste on-site d) To recycle hazardous waste	K2	CO1
2	3	Name the fixed carbon in proximate analysis a) Carbon that escapes during combustion b) Carbon remaining after volatile matter is driven off c) The total carbon in the fuel d) Carbon lost as ash	K2	CO1
	4	Find the heating value of PVC a) 4000 BTU/lb b) 6763 BTU/lb c) 6700 BTU/lb d) 4050 BTU/lb	K1	CO2
3	5	Which of the following Indian Standard (IS) code is used for composite materials a) National Institute of Standards b) Bureau of Indian Standards (BIS) c) Indian Standards Organization d) Indian Council for Scientific Research	K1	CO1
	6	What is the primary purpose of switching to renewable energy sources a) Cost-cutting strategy b) Corporate environmental responsibility c) Competitive Marketing d) Employee retention program	K2	CO1
4	7	Name the waste generated by the used solvents and corrosive chemicals. a) Universal waste b) E-waste c) Multiple hazardous waste types d) Recyclable waste	K2	CO2
	8	Which type of hazardous waste is commonly used to treat activated carbon? a) Solid metals b) Gaseous emissions c) Organic chemicals and solvents d) Radioactive materials	K2	CO2
5	9	Which one of the following is the main component of fly ash? a) Calcium b) Silica c) Iron d) Magnesium	K1	CO1
	10	Illustrate a common challenge faced by social entrepreneurs? a) Lack of innovative ideas b) Difficulty in balancing social impact with financial sustainability c) Excessive government support d) Overabundance of qualified employees	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 different methods for measuring waste composition.	K3	CO4
		(OR)		
	11.b.	Identify how demographic factors shape waste management strategies in urban and rural settings?		
2	12.a.	Analyse the challenges arise from the variability in waste characteristics, and how can they be addressed to improve waste recovery rates?	K4	CO4
		(OR)		
	12.b.	Examine the interaction between biological waste characteristics and ecosystem dynamics.		
3	13.a.	Construct the role of engineered landfills in modern waste management.	K3	CO3
		(OR)		
	13.b.	Identify the role of the circular economy in transforming waste management systems.		
4	14.a.	Discover a comprehensive strategy for managing hazardous waste in a developing country.	K4	CO3
		(OR)		
	14.b.	Compare and contrast methods such as incineration, chemical treatment, and bioremediation.		
5	15.a.	Evaluate how Earthship designs contribute to reducing carbon footprints and resource consumption?	K5	CO4
		(OR)		
	15.b.	Appraise the role of technological advancements in improving the classification of e-waste.		

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	Infer the functional elements of solid waste management and provide examples of how each element is implemented in both developed and developing nations.	K4	CO4
2	17	List the importance of understanding the biological composition of waste in developing waste-to-energy systems.	K4	CO3
3	18	Evaluate the transition from the 4R to the 5R waste management concept. How does the inclusion of "Refuse" reshape the strategies for sustainable waste management?	K5	CO4
4	19	Evaluate the effectiveness of physical treatment methods in managing hazardous waste and list the limitations.	K5	CO4
5	20	Discuss the process involved in scaling social enterprises within different ecosystems.	K6	CO5

Z-Z-Z

END

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2024
(Second Semester)

Branch- ENVIRONMENTAL SCIENCE

ENVIRONMENTAL BIOTECHNOLOGY AND NANO TECHNOLOGY

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(10 × 1 = 10)

Question No.	Question	K Level	CO
1	The term 'carbon footprint' refers to ____. a) Amount of NO ₂ released to the atmosphere b) Amount of CO ₂ utilized by plants c) Amount of CO ₂ sequestered d) Amount of CO ₂ released to the atmosphere	K1	CO1
2	Biomanipulation is process of introducing ____ to the water bodies to predate on algal blooms. a) Phytoplanktons b) Zooplanktons c) Fishes d) Chemical agents	K2	CO1
3	Thiobacillus ferrooxidans is associated with a) Biodecolourisation b) Biofiltration c) Biosurfactants d) Bioleaching	K1	CO2
4	Bioremediation with the application of green plants are known as a) Biofiltration b) Bioaugmentation c) Phytoremediation d) None of these	K2	CO2
5	Heterocysts are related to a) Nitrate assimilation b) Nitrogen fixation c) Bioremediation d) Bioleaching	K1	CO3
6	Biosafety level 3 is for ____ a) Pathogens that are not fatal b) Pathogens that are fatal but treatment exist c) Pathogens that are fatal and no treatment exist d) None of these	K2	CO3
7	Fullerenes are allotropes of a) Carbon b) Aluminium c) Silicon d) Zeolites	K1	CO4
8	Turkevich method is commonly used for the synthesis of ____ using ____ a) Silver nanoparticles using zeolites b) Gold nanoparticles using Citrate c) Nanopolymers using organosilicates d) None of these	K2	CO4
9	Carbon nanotubes are considered as good adsorbents due to a) High Surface area b) High aspect ratio c) Better material properties d) All of these	K1	CO5
10	Who is considered as Father of Nanotechnology? a) Philip Johnson b) Buckminster Fuller c) Heinrich Rohrer d) Frank Lloyd	K2	CO5

Cont...

SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 × 7 = 35)

Question No.	Question	K Level	CO
11.a.	Outline the regulations on application of GMOs on environmental issues.	K2	CO1
	(OR)		
11.b.	Explain the methods adopted in cell immobilization and bioremediation.		
12.a.	What are the environmental impacts of bioleaching? Demonstrate a potential adverse effect.	K2	CO2
	(OR)		
12.b.	Define heavy metals as pollutants with Cd as example.		
13.a.	Illustrate on the guidelines followed by India in biosafety in pathogenesis.	K3	CO3
	(OR)		
13.b.	What are the advantages of application of organic fertilizers and cellulolytic microbes?		
14.a.	Demonstrate the chemical methods of nanoparticle synthesis.	K3	CO4
	(OR)		
14.b.	Explain about the characterization of any nanomaterial for the synthesis of nanoparticle.		
15.a.	Elaborate on nano-based water treatment.	K5	CO5
	(OR)		
15.b.	Explain about the organic pollutants present in soil.		

SECTION - C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks

(3 × 10 = 30)

Question No.	Question	K Level	CO
16	What causes algal blooms? Outline the ecosystem damage due to severe algal blooms.	K2	CO1
17	Demonstrate about the oil pollution and bioremediation in aquatic environment.	K3	CO2
18	Classify various nitrogen fixers and explain the mechanism of nitrogen fixation.	K2	CO3
19	Elaborate on the possible hazards and management in the implementation of nano materials as remedial measures in the environment.	K4	CO4
20	Write an essay on 'practical difficulties in the application of nano-engineering and pollution prevention'.	K5	CO5

Z-Z-Z END