



## **BRAINWARE UNIVERSITY**

## Term End Examination 2023-2024 Programme - M.Sc.(BT)-2022 Course Name – Environmental Biotechnology Course Code - MBTE304 (Semester III)

Time: 2:30 Hours Full Marks: 60

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

## Group-A

1 x 15=15

- (Multiple Choice Type Question) 1. Choose the correct alternative from the following: (i) Which of the following is a biological treatment process used in wastewater treatment? b) b) Reverse osmosis a) a) Chemical precipitation d) d) Sedimentation c) c) Activated sludge process (ii) The controlled burning of waste materials in the absence of oxygen is known as: b) Incineration a) Pyrolysis d) Landfilling c) Composting (iii) Which of the following is a genetically modified crop designed for environmental benefits, such as reduced pesticide use? b) Roundup Ready soybeans a) Bt cotton d) Non-GMO corn c) Golden Rice (iv) What is the primary role of mycorrhizal fungi in environmental biotechnology? b) Enhancing plant growth and nutrient a) Breaking down pollutants in soil uptake c) Producing biofuels d) Treating wastewater (v) What is the primary role of a biosensor in environmental monitoring?
  - - a) To generate electricity from environmental pollutants
- b) To remove contaminants from water
- c) To detect and measure specific substances in the environment
- d) To purify air in industrial settings
- (vi) Which microorganism is commonly used in bioremediation to degrade hydrocarbons in contaminated sites?
  - a) E. coli

b) Saccharomyces cerevisiae

c) Pseudomonas aeruginosa

- d) Bacillus anthracis
- (vii) What is the primary objective of the Kyoto Protocol?
  - a) a) Control soil erosion

- b) b) Reduce greenhouse gas emissions
- c) c) Protect endangered species
- d) d) Promote renewable energy

(viii)	Biodegradation of organic pollutarits depends o	L\	
	a. Microbial and physical/chemical environments	b) b. Wind direction	
/:V	c) c. Temperature of the atmosphere	d) d. Geographical location	
(IX)	What is phytoremediation?	b) The use of plants to remove contamin	nants
	a) The use of bacteria to clean up pollutants	from the environment	
(x)	c) The use of enzymes to degrade toxins  Which pollutant is associated with the formation of photochemical smog in urban areas?		lants
	a) a) Sulfur dioxide (SO2)	b) b) Nitrogen oxides (NOx)	
(xi)	c) c) Carbon monoxide (CO) Which molecular method is commonly used for	d) d) Ozone (O3) DNA-based pollution monitoring?	
	a) A. Polymerase chain reaction (PCR)	b) B. Gas chromatography	
	c) C. Mass spectrometry	d) D. X-ray crystallography	
(xii)	The primary source of atmospheric sulfur dioxid	to (SOZ) is mainly morn.	
	a) Volcanic eruptions	<ul><li>b) Industrial emissions</li><li>d) Bacterial activity</li></ul>	
(xiii	c) Forest fires ) What is the primary function of biodegradable	.•	
<b>(</b> //	a) To persist in the environment for a long time	b) To resist microbial degradation	
	c) To decompose naturally into harmless substances	d) To release toxic chemicals when degr	aded
(xiv	) Which type of bioplastics are derived from rene sugarcane?	ewable resources like corn starch or	
	a) Polylactic acid (PLA)	b) Polyethylene (PE)	
(xv	<ul><li>c) Polypropylene (PP)</li><li>) What is the term for the process of converting such as biogas or biofertilizers?</li></ul>	d) Polystyrene (PS) organic waste into valuable products,	
	a) Fermentation	b) Anaerobic digestion	
	c) Bioconversion	d) Photosynthesis	
	Grou		
	(Short Answer T	ype Questions)	3 x 5=15
	Discuss the potential risks associated with the use GMOs) for environmental applications and strate	gies to mitigate these ricks	(3)
3. /	Assess the primary biodegradation of organic noll	utante	(3)
٠, ١	4. How does the process of denitrification affect the nitrogen cycle in agricultural soils, and what are its implications for environmental sustainability?		
5.	Define bioremediation and provide an example of	ite and the second	
6.	How do microplastics enter aquatic ecosystems, a of their presence in marine food chains?	nd what are the ecological consequences	(3) (3)
	O Company the street way of the company of the comp	R	
	How can the application of nanosensors aid in reapparameters such as pollution levels and water qua	II-time monitoring of environmental ality?	(3)
	Grou	<b>лр-С</b>	
	(Long Answer T		5 x 6=30
7.	Describe the principles of anaerobic digestion ar waste into biogas.	nd its significance in converting organic	(5)

8. Discuss the role of enzymes in environmental biotechnology processes and provide (5) examples of their applications. 9. Describe the role of bioinformatics in analyzing metagenomic data from environmental (5) samples. Provide examples of how metagenomics can aid in bioprospecting and understanding microbial diversity. 10. Elaborate on the principles of bioaugmentation and its role in enhancing microbial (5) degradation of recalcitrant pollutants. 11. Evaluate the role of biofouling in membrane-based water treatment systems and strategies (5) to mitigate its effects. 12. Explain the concept of green chemistry and its integration into environmental (5) biotechnology processes. Provide examples of green chemistry principles in action. OR Describe the principles of wastewater reuse and its potential benefits for water (5) conservation and sustainability. Discuss the challenges and treatment processes involved.