
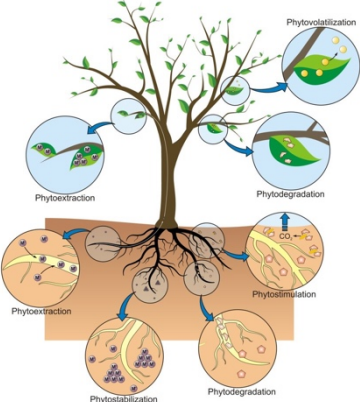


<b>Name:</b>			
<b>Enrolment No:</b>			
<b>UPES</b>			
<b>End Semester Examination, December 2023</b>			
<b>Course: Green Biotechnology and Pollution Abatement</b>		<b>Semester: III</b>	
<b>Program: Biotechnology</b>		<b>Duration: 3 Hours</b>	
<b>Course Code: HSBT 2005</b>			
<b>Max. Marks: 100</b>			
<b>Instructions:</b>			
<b>S. No.</b>	<b>Section A</b>	<b>Marks</b>	<b>COs</b>
	<b>Short answer questions/ MCQ/T&amp;F (20Qx1.5M= 30 Marks)</b>		
<b>Q 1</b>	<b>What is the primary purpose of genetic engineering in biotechnology?</b> A) To enhance biodiversity B) To create genetically modified organisms C) To study animal behavior D) To preserve natural habitats	<b>1.5</b>	<b>CO3</b>
<b>Q 2</b>	<b>Which of the following techniques is used for gene editing in biotechnology?</b> A) PCR (Polymerase Chain Reaction) B) CRISPR-Cas9 C) Gel Electrophoresis D) Western Blotting	<b>1.5</b>	<b>CO1</b>
<b>Q 3</b>	<b>What is the primary goal of sustainable bioproducts in reducing environmental impact?</b> A) Increasing greenhouse gas emissions B) Utilizing non-renewable resources C) Minimizing waste and pollution D) Expanding deforestation	<b>1.5</b>	<b>CO2</b>
<b>Q 4</b>	<b>How do sustainable bioproducts contribute to a circular economy?</b> A) By increasing single-use plastic production B) By reducing waste and encouraging recycling C) By promoting disposable products D) By relying on non-renewable energy sources	<b>1.5</b>	<b>CO1</b>
<b>Q 5</b>	<b>Which of the following activities is a form of bio restoration?</b> A) Deforestation B) Afforestation C) Desertification D) Overfishing	<b>1.5</b>	<b>CO2+4</b>

<b>Q 6</b>	<b>Which of the following industries extensively utilizes biotransformations and biocatalysts for various processes?</b> A) Textile industry B) Food and beverage industry C) Automotive industry D) Construction industry	<b>1.5</b>	<b>CO1</b>
<b>Q 7</b>	<b>Which of the following is a characteristic feature of biocatalysts in comparison to chemical catalysts?</b> A) Higher cost B) Lower specificity C) Mild reaction conditions D) Shorter reaction times	<b>1.5</b>	<b>CO4</b>
<b>Q 8</b>	<b>Which of the following statements about xenobiotic compounds is true?</b> A) They are naturally occurring substances in the human body. B) They are synthetic chemicals that are not naturally found in living organisms. C) They are exclusively produced by plants for self-defense. D) They are essential nutrients required for metabolic processes.	<b>1.5</b>	<b>CO3</b>
<b>Q 9</b>	<b>How can xenobiotic compounds enter the human body?</b> A) Only through inhalation B) Only through ingestion C) Through inhalation, ingestion, and dermal contact D) Only through injection	<b>1.5</b>	<b>CO1+2</b>
<b>Q 10</b>	<b>What role do Phase II enzymes play in xenobiotic metabolism?</b> A) They activate xenobiotics, making them more toxic. B) They detoxify xenobiotics by conjugating them with endogenous molecules. C) They break down xenobiotics into smaller fragments. D) They transport xenobiotics across cellular membranes.	<b>1.5</b>	<b>CO3</b>
<b>Q 11</b>	<b>How can xenobiotic compounds enter the human body?</b> A) Only through inhalation B) Only through ingestion C) Through inhalation, ingestion, and dermal contact D) Only through injection	<b>1.5</b>	<b>CO1+2</b>
<b>Q 12</b>	<b>Which of the following substances is an example of a recalcitrant compound that is resistant to biodegradation?</b> A) Cellulose B) Polyethylene C) Glucose D) Ethanol	<b>1.5</b>	<b>CO2</b>
<b>Q 13</b>	<b>Which class of compounds is typically resistant to biodegradation due to their stable chemical structure?</b>	<b>1.5</b>	<b>CO1</b>

	<p>A) Simple sugars  B) Alkanes  C) Amino acids  D) Carboxylic acids</p>		
<b>Q 14</b>	<p><b>What is the significance of cometabolism in biodegradation processes?</b>  A) It enhances the degradation of multiple pollutants by microorganisms  B) It inhibits the activity of enzymes involved in degradation  C) It accelerates the degradation of recalcitrant compounds  D) It reduces the bioavailability of pollutants</p>	<b>1.5</b>	<b>CO1</b>
<b>Q 15</b>	<p><b>Which of the following is a common symbiotic relationship involving nitrogen-fixing bacteria?</b>  A) Rhizobium with leguminous plants  B) Nitrosomonas with orchids  C) Pseudomonas with grasses  D) Bacillus with coniferous trees</p>	<b>1.5</b>	<b>CO2</b>
<b>Q 16</b>	<p><b>Which of the following statements about nitrogen-fixing bacteria is correct?</b>  A) They are unable to fix nitrogen in the absence of oxygen.  B) They are inhibited by the presence of nitrates in the soil.  C) They play a crucial role in increasing soil nitrogen content, promoting plant growth.  D) They fix nitrogen by converting atmospheric nitrogen directly into nitrate ions.</p>	<b>1.5</b>	<b>CO1</b>
<b>Q 17</b>	<p><b>Which bioreactor configuration is commonly used for wastewater treatment applications?</b>  A) Batch bioreactor  B) Membrane bioreactor  C) Airlift bioreactor  D) Trickling filter bioreactor</p>	<b>1.5</b>	<b>CO3</b>
<b>Q 18</b>	<p><b>What is the role of a sparger in a bioreactor?</b>  A) To measure pH levels  B) To control temperature  C) To introduce gases (such as oxygen) into the liquid medium  D) To measure pressure</p>	<b>1.5</b>	<b>CO1</b>
<b>Q 19</b>	<p><b>What does the term "scale-up" refer to in the context of bioreactor design?</b>  A) Increasing the size of microorganisms  B) Expanding the production scale from laboratory to industrial levels  C) Reducing the temperature of the bioreactor  D) Adding more agitation to the bioreactor</p>	<b>1.5</b>	<b>CO3+4</b>
<b>Q 20</b>	<p><b>What is the term for the relationship in which PGPR colonize the rhizosphere of plants and provide benefits without causing diseases?</b>  A) Pathogenic relationship</p>	<b>1.5</b>	<b>CO1+4</b>

	B) Symbiotic relationship C) Mutualistic relationship D) Commensalistic relationship		
<b>Section B</b> <b>(4Qx5M=20 Marks)</b>			
Q 1	Explain the role of microorganisms in biodegradation.	5	CO3
Q 2	Explain why mycorrhizal inoculation is sometimes used in reforestation efforts.	5	CO2
Q 3	What is phytoremediation, and how does it contribute to environmental sustainability?	5	CO1+4
Q 4	Examine the role of biotechnology in conserving biodiversity and preserving endangered species. How can biotechnology aid in species recovery and habitat restoration?	5	CO3
<b>Section C</b> <b>(2Qx15M=30 Marks)</b>			
Q 1	In the quest for sustainable agriculture and renewable energy sources, biotechnology has paved the way for the development and application of bioethanol, biohydrogen, biodiesel, biofertilizers, and biopesticides. Discuss the production processes, environmental impact, advantages, challenges, and future prospects associated with <u>any one of these categories</u> (flowcharts would be good).	15 (5+5+5)	CO1+4
Q 2	Find out what is happening in the given picture and write down the 1. Process, 2. Methods and 3. Applications.	15 (5+5+5)	CO1+2 +3
			
<b>Section D</b> <b>(2Qx10M=20 Marks)</b>			
Q 1	Discuss ongoing research or emerging technologies related to enhancing the efficiency of nitrogen-fixing bacteria. How might these advancements revolutionize sustainable agriculture practices?	10 (5+5)	CO1+2
Q 2	Evaluate the long-term ecological consequences of releasing genetically engineered organisms into the environment. What factors should be considered when assessing their persistence and potential invasiveness (Flowcharting your thoughts would be helpful)?	10(5+5)	CO3+4