

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATIONS- 2026

M.Sc.-II Semester (Biotechnology)

COURSE CODE (CREDITS): 20MSWBT232 (02)

MAX. MARKS: 35

COURSE NAME: Environmental Biotechnology

COURSE INSTRUCTORS: Ashok Kumar Nadda

MAX. TIME: 2.0 Hours

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q.No	Questions	Marks
Section I		
Q1	a) What are phosphate-solubilizing microorganisms? Give examples and explain their importance.	1
	b) Differentiate between bacteroids and free-living <i>Rhizobium</i> cells. How does they contribute in atmospheric nitrogen fixation?	1
	c) How might excessive use of chemical fertilizers affect the fertility of the soil? Give two major reasons.	1
	d) Explain the role of manganese peroxidase and lignin peroxidase in bioremediation.	1
	e) Explain how integrating biohydrogen and biomethanol production could improve energy sustainability.	1
Section II		
Q2	How mycorrhizae does protect plants from soil-borne pathogens. What are arbuscules and vesicles in mycorrhizal associations? Explain the ecological importance of mycorrhizal associations.	2.5
Q3	Give an account of <i>Azotobacter</i> and <i>Azospirillum</i> as biofertilizers. Mention the advantages of using biofertilizers over chemical fertilizers.	2.5
Q4	Explain how microorganisms contribute indirectly to biomethanol production through biomass conversion. Discuss the importance of pretreatment in biomass-based methanol production.	2.5
Q5	Explain how microbial biopesticides reduce environmental pollution. Discuss the importance of integrated pest management (IPM) using biocontrol agents.	2.5
Q6	How biohydrogen can contribute to reducing greenhouse gas emissions.	2.5

	Enlist the various microbes and major steps involved in the biohydrogen production.	
Q 7	Describe the role of extracellular polymeric substances (EPS) in metal binding. How microorganisms participate in biogeochemical cycling of metals.	2.5
	Section III	
Q 8	Compare aerobic and anaerobic Microbial enhanced oil recovery (MEOR) processes with suitable examples. Describe the role of nutrient injection strategies in stimulating indigenous reservoir microorganisms. What is the significance of interfacial tension and wettability alteration in microbial oil recovery.	5
Q 9	Define symbiosomes and explain their formation in legume root nodules. Describe the role of symbiosomes in nitrogen fixation. Explain how symbiosomes help to maintain a suitable environment for nitrogenase activity.	5
Q 10	Why are non-specific ligninolytic enzymes advantageous in degradation of complex pollutants? Explain how white rot fungi can degrade pollutants structurally unrelated to lignin. Highlight the limitations of large-scale fungal bioremediation in industrial applications.	5
	Total marks	35