JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2023

M. Tech./Ph.D. I Semester (Biotechnology)

COURSE CODE (CREDITS): **18M1WBT134 (03)** **MAX. MARKS: 35**

COURSE NAME: **Microbial Ecology**

COURSE INSTRUCTORS: **Ashok Kumar Nadda** **MAX. TIME: 2 Hours**

Note: *(a) All questions are compulsory.*
(b) Marks are indicated against each question in brackets.
(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Section I

Q 1 Very short answer type questions

a) Describe a scenario where commensalism is observed among microorganisms. **[Mark 1]**

b) Define an estuary and describe its unique characteristics. **[Mark 1]**

c) How does nutrient enrichment, particularly phosphorus and nitrogen, influence the health and balance of lake ecosystems? **[Mark 1]**

d) Provide examples of species that are specially adapted to life in swamp bogs. **[Mark 1]**

e) Provide an example of syntrophic interactions among microorganisms. **[Mark 1]**

Section II

Q 2 Which microorganisms are commonly used in bioleaching, and how do they contribute to the solubilization of metals? Discuss the applications of bioleaching in the mining industry. **[Marks 3]**

Q 3 Explore the functions of wetlands in freshwater ecosystems. Why are wetlands considered important for biodiversity, water filtration, and flood control? **Marks 3]**

Q 4 Explain the principle of pyrosequencing and the chemistry involved in nucleotide incorporation. How does pyrosequencing enable the sequencing of DNA with real-time monitoring? **[Marks 3]**

Q 5 What is biomining, and how does it involve the use of microorganisms in mineral extraction? Can you describe the principles of biomining and the types of minerals targeted? **[Marks 3]**

Q 6 What is a marine ecosystem, and how does it differ from terrestrial ecosystems? How do various species adapt to the diverse and challenging environments within the ocean? **[Marks 3]**

Section III

Q 7 Describe the key characteristics of temperate forests, including climate, vegetation, and biodiversity. What are the unique challenges and characteristics of tundra ecosystems? **[Marks 3]**

Q 8 Can you explain the various mechanisms involved in microbial biodegradation of contaminants? How might biodegradation contribute to reducing the environmental impact of industrial pollutants? **[Marks 4]**

Q 9 Identify the advantages and limitations of real-time PCR compared to other nucleic acid detection methods. How does real-time PCR contribute to high-throughput screening in genomics research? **[Marks 4]**

Q 10 Explain the principle behind fluorescence in situ hybridization (FISH) and the steps involved in the procedure. How is FISH used to visualize specific nucleic acid sequences in cells? Can you provide examples of genetic abnormalities that can be detected using FISH? **[Marks 4]**