Note: All questions are compulsory. Marks are indicated against each question in square brackets.

Section I

Q1. Answer the following questions. Each question is carrying one mark only.

    a) What are the hazardous waste released from paint and textile industry and their effects on human health? **[Mark 1]**

    b) Name the two microorganisms that help in the removal of nuclear waste. **[Mark 1]**

    c) What is strain improvement, and why is it important in environmental microbiology? **[Mark 1]**

Section II

Q 2 What role do nitrogen-fixing bacteria play in the nitrogen cycle? How does phosphorus move through the biogeochemical cycle, and why is it considered a limiting nutrient in ecosystems? **[Mark 2]**

Q 3 Write a short note on the plant mediated removal of the heavy metals from soils. Name those plants that help in the removal of specific metals including Pb, Hg, Zn and petroleum hydrocarbon. **[Mark 2]**

Q 4 How do *in situ* and *ex situ* bioremediation techniques differ, and what are the advantages and disadvantages of each? What role do bacteria play in the bioremediation of oil spills? **[Mark 2]**

Section III

Q 5 How does the rhizosphere influence the effectiveness of phytoremediation, and what strategies are used to enhance this interaction? What are the environmental and economic benefits of using phytoremediation over chemical or mechanical methods for pollution cleanup? **[Mark 3]**

Q 6 Discuss the various microbial processes used by the microorganisms to remove the heavy metals pollutants from the environment. Explain with suitable examples **(Marks 3)**