

**N.B. All questions are compulsory**  
**Numbers to the right indicate marks**  
**Draw neat labeled diagram wherever necessary**

**Duration: 2.5 hours**

**Total marks: 60**

**Q.1 Answer any four of the following**

**16**

- a. What is aeromicrobiology? Write a note on airborne bacterial toxins.
- b. Justify, 'Smaller particles are of major concern than larger ones in spread of infection'.
- c. Compare and contrast between extramural and intramural aeromicrobiology.
- d. How do hospitals and laboratories play a role in intramural environments for bioaerosol spread?
- e. Define soil and add a note on its composition.
- f. Write a note on different types of microorganisms in soil.
- g. Write a note on Actinorhizae.
- h. Give a brief account on Rhizosphere and Rhizoplane.

**Q.2 Answer any four of the following**

**16**

- a. Write a short note on Ozone Depletion.
- b. Explain Geothermal energy as a renewable source of energy.
- c. Classify and explain the pollutants responsible for causing air pollution.
- d. Enlist the major steps in Biogas production. Give a detailed account on any two steps of Biogas production.
- e. Explain the major causes of biodiversity loss observed in recent years.
- f. Schematically explain the process of Bioethanol production.
- g. Describe the use of *Botryococcus braunii* as a source of energy.
- h. Justify: Solar passive heating aids in harnessing solar energy.

**Q.3 Answer any four of the following**

**16**

- a. Diagrammatically explain the different processes of phytoremediation.

- b. What is *in-situ* bioremediation? Explain Bioventing as a method of bioremediation.
- c. Justify: Biofilters can be used to remove gaseous pollutants for controlling air pollution.
- d. Write a note on Biosorption as a means of metal bioremediation.
- e. Elaborate the process of Environmental Impact Assessment in a stepwise manner.
- f. Explain the use of genetically manipulated organisms as a bioremediation strategy using suitable example.
- g. Write a note on bioremediation of contaminated groundwater.
- h. Describe Windrow composting as a method of *ex-situ* bioremediation.

**Q.4** Answer **any six** of the following

**12**

- a. What do you understand by  $PM_{10}$  and  $PM_{2.5}$ ?
- b. How does oxygen affect microbial survival in the air?
- c. Write any two organisms involved in the Nitrogen cycle.
- d. Define phyllosphere. Write one significance.
- e. Enlist two types of Biogas plants.
- f. State two laws related to solid waste management in India.
- g. Give the full form of ENSO. How does climate change affect ENSO?
- h. State one advantage and one disadvantage of using plant-oils as a renewable and carbon-neutral replacement for diesel.
- i. State two objectives of EIA.
- j. Give two examples of Hyperaccumulator plants.
- k. What is Bioaugmentation?
- l. Write the reactions representing extracellular precipitation of heavy metals.