M.Tech Even Semester Examination, May, 2025

Agricultural Engineering

(2nd Semester)

Course No: 4AG-154B

(Water Quality Management)

Full Marks: 70
Pass Marks: 28
Time: 3 hours

Note:

1. Attempt any five questions taking one from each unit.
2. Begin each answer in a new page
3. Answer parts of a question at a place
4. Assume reasonable data wherever required
5. The figure in the right margin indicates full marks for the question
6. All the mathematical symbols and abbreviations have their usual meanings.

1. a) Explain the need for water quality data in water resource management. 4

   b) Describe the major pollutants commonly found in river systems and their impact. 4

   c) Discuss the significance of drinking water standards and how they are developed. 6

2. a) What are the major sources of water composition and how does watershed protection influence it? 5

   b) Explain the process and importance of surface and groundwater quality sampling. 5

   c) Describe how water demand and pricing impact water supply economics. 4

UNIT-II

3. a) Describe the purpose and mechanism of equalisation and screening in wastewater treatment. 5

   b) Explain the process of sedimentation and flotation in detail. 5

   c) Write short notes on: (i) Membrane filtration (ii) Temperature control in treatment plants.c) Explain the functioning 4

4. a) What is the role of shredding and grit removal in protecting downstream processes? 4

   b) Describe the types of filtration used in water treatment systems. 5

   c) Explain the functioning and significance of pumping systems in treatment facilities. 5

UNIT-IV

5. a) Describe the chemical principles involved in coagulation and flocculation. 5

   b) Explain the mechanism of disinfection and its commonly used agents 5

   c) Write short notes on: 4

   (i) Air stripping (ii) Ion exchange

6. a) Explain the role of pH control and metal precipitation in water treatment. 6

   b) Describe the process and applications of chemical oxidation and reduction in contaminant removal. 4

   c) What are the factors affecting adsorption of aqueous compounds? 4

UNIT-IV

7. a) Explain the theory of aerobic and anaerobic biological treatment processes. 6

   b) Describe the structure and function of constructed wetlands in wastewater treatment. 4

   c) What is the role of microbiology in wastewater treatment? 4

8. a) Differentiate between aerobic, anaerobic, and anoxic biological treatment methods. 6

   b) Discuss the advantages and limitations of using constructed wetlands. 4

   c) Explain the role of microbial communities in activated sludge systems. 4

UNIT-V

9. a) Explain the concept of dispersion in rivers and streams with respect to pollution transport. 4

   b) Derive a basic differential equation used in modeling biochemical pollution in water bodies. 6

   c) Describe the finite difference method and its application in pollution transport modeling. 4

10. a) What are the fundamental expressions used in pollution transport modeling? 4

    b) Explain the application of finite element method in modeling pollutant transport in aquatic systems. 5

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