B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B.E.   Semester: V
Branch: CIVIL ENGINEERING   Duration: 3 hrs.
Course Code: 20CV5PCWWT   Max Marks: 100
Course: Waste Water Treatment

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data if any, may be suitably assumed.

UNIT - I

1. a) Compare Conservancy and water carriage system of sewage Also mention their merits and demerits. **06**

b) Define Sewage. Illustrate the effect of wastewater flow variations on velocity **06**

c) Design a sewer to serve a population of 36000. The daily per capita water supply allowance being 135litres, of which 80 percent finds its way into the sewer. The slope available for the sewer to be laid is 1 in 625 and the sewer should be designed to carry four times the dry weather flow when running full. What would be the velocity of flow in the sewer when running full **08**

UNIT – II

2. a) List the basic principles of house drainage with layout plan showing house drainage. **08**

b) With neat sketch, Describe the components of a manhole. **04**

c) Illustrate the various joints in sewers. Explain Spigot and socket joint and Mechanical joint in detail with neat sketch **08**

UNIT - III

3. a) List and explain the characteristics of waste water. **10**

b) A waste water effluent of 560l/s with a BOD=50mg/l, DO=3mg/l and temperature of 23^0C enters a river where the flow is $28m^3$/sec and BOD=4mg/l, DO=8.2 mg/l and temperature of 17^0C. Determine the following after mixing of wastewater with the river water: (i)Combined discharge (ii)BOD (iii)DO (iv) Temperature **04**

c) What is sewage sickness? Explain how sewage sickness can be prevented. **06**

OR

4 a) The BOD_5 of a waste has been measured as 600mg/l. If rate constant k=0.23/day, what is the ultimate BOD of the waste. What proportion of the ultimate BOD would remain unoxidised after 20 days?   **06**

   b) What is sampling? Describe its significance, techniques and frequency.   **06**

   c) What do you understand by "self-purification" in natural waters? Explain the various agents and processes involved in self-purification process.   **08**

UNIT - IV

5 a) Draw a flow diagram of a municipal sewage treatment plant and mention the functions of each unit   **10**

   b) Design a continuous flow rectangular primary sedimentation tank fitted with mechanical sludge cleaning equipment for treating the sewage from a city having a population of 80000 persons which has an assured water supply rate of 100lpcd. Assume the maximum flow to be 1.4 times the average flow. The necessary design parameters may be assumed.   **10**

OR

6 a) Differentiate between suspended growth biological treatment and the fixed film bioprocess. Define (i)F/M ratio (ii)SVI (iii)MLVSS   **10**

   b) Design a conventional activated sludge plant to treat domestic sewage with diffused air aeration system, given the following data, Population=35000, Average sewage flow=180lpcd, BOD removal in primary treatment=30%, overall BOD reduction desired=85%   **10**

UNIT - V

7 a) Explain reverse osmosis technique for treating wastewater   **08**

   b) Illustrate the principle of Ion exchange method   **06**

   c) Briefly explain the MF, UF and NF techniques.   **06**

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