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**Fifth Semester B.E. Degree Examination, July/August 2022**  
**Municipal Wastewater Engineering**

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions, choosing ONE full question from each module.**

**Module-1**

- 1 a. Explain the Need of Sanitation. (04 Marks)  
b. Explain the method of sewage disposal with advantages and disadvantages. (10 Marks)  
c. Explain the principles of good house drainage. (06 Marks)

**OR**

- 2 a. Explain the time of concentration with its components. (08 Marks)  
b. Assuming that the surface on which the rain falls in a district is classified as follows :  
20% of the area consists of roof for which the runoff ratio is 0.9, 20% of the area consists of pavements for which the runoff ratio is 0.85, 5% of the area consists of paved yards of houses for which runoff is 0.80, 15% of area consists of macadam roads for which run off ratio is 0.40, 35% of the area consists of lawns, gardens and vegetable plants for which the runoff ratio is 0.10 and the remaining 5% of the area is wooded for which the runoff ratio is 0.05, determine the co-efficient of runoff for the area. If the total area of the district is 36 hectares and the maximum rain intensity is taken as 5cm/hr, what is the total run off for the district? (08 Marks)  
c. What is wet weather flow? Discuss the factors affecting wet weather flow. (04 Marks)

**Module-2**

- 3 a. Explain briefly :  
i) Self cleaning velocity  
ii) Non-scouring velocity. (08 Marks)  
b. State hydraulic elements for circular sewer for full flow and half flow conditions. (12 Marks)

**OR**

- 4 a. With neat sketch flow diagram, explain unit operation and process of Municipal Waste Water Treatment. (06 Marks)  
b. The BOD<sub>5</sub> of a waste water is 150mg/l at 20°C, the 'K' value is known to be 0.23 per day, what would BOD<sub>8</sub> be if the test was run at 15°C? (08 Marks)  
c. Explain the physical, chemical and biological characteristics of waste water. (06 Marks)

**Module-3**

- 5 a. Discuss briefly with neat sketch Grit Chamber, oil and grease removal tank, screen's and its types. (12 Marks)  
b. Explain self purification of natural water bodies; also explain various factors affecting self purification. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 6 a. Discuss zones of purification with neat sketch. (08 Marks)  
 b. A city discharges 1500 litres per second of sewage into a stream whose minimum rate of flow is 6000 liters per second. The temperature of sewage as well as water is 20°C. The 5 day B.O.D at 20°C for sewage is 200mg/l and that of river water is 1 mg/lit. The D.O. content of sewage is zero and that of the stream is 90% of the saturation D.O. If the minimum to be maintained in the stream is 4.5mg/l, find out the degree of sewage treatment required. Assume the de-oxygenation coefficient as 0.1 and re-oxygenation co-efficient as 0.3. (12 Marks)

Module-4

- 7 a. With a neat diagram, explain activated sludge process. (08 Marks)  
 b. Explain with neat sketch the working of trickling filter. What is the principle on which it is working? (08 Marks)  
 c. Explain rotating biological contactor. (04 Marks)

OR

- 8 a. Explain principle of stabilization ponds with a diagram. (08 Marks)  
 b. Explain :  
 i) Thickness  
 ii) Drying Bed  
 iii) Equalization. (12 Marks)

Module-5

- 9 a. Discuss in briefly Nitrification and Denitrification process. (04 Marks)  
 b. Explain with neat sketch electro coagulation method. (08 Marks)  
 c. What do you mean by low cost treatment and explain various methods involved in cost treatment. (04 Marks)

OR

- 10 a. Discuss in briefly :  
 i) Eco – toilet  
 ii) Soak pits. (10 Marks)  
 b. Design the dimensions of a septic, tank for a small colony of 150 persons provided with an assured water supply from the municipal head works at a rate of 120 liters per person per day. Assume any data, you may need. (10 Marks)

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