CBCS SCHEME

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15CV71

Seventh Semester B.E. Degree Examination, Dec.2023/Jan.2024
Municipal and Industrial Waste Water Engineering

Time: 3 hrs. Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Any missing data can be assumed.

Module-1

1 a. Define sanitation. Mention advantages and disadvantages of different methods of sewage disposal. **(08 Marks)**

b. Name different types of sewage system with their advantages and disadvantages. **(08 Marks)**

OR

2 a. With sketch explain shapes of sewers. **(08 Marks)**

b. Draw a neat plan showing house drainage connections with labeling parts. **(08 Marks)**

Module-2

3 a. Explain briefly the dilution method of disposal of sewage. What are the factors which influence the choice of the method to be adopted? **(06 Marks)**

b. Design a sewer to serve a population of 36,000, the daily per capita water supply allowance being 135 lt, of which 80%, find 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? **(10 Marks)**

OR

4 a. Discuss in details the process Deoxygenation and Reoxygenation with respect to self –purification of Natural water with a neat sketch. **(08 Marks)**

b. Write short notes on :
i) Sewage sickness ii) Sewage farming. **(08 Marks)**

Module-3

5 a. Derive an expression for first stage BOD with usual notations. **(06 Marks)**

b. Define the terms BOD and COD. **(04 Marks)**

c. The 5 day BOD @ 20°C of a sewage sample was found to be 100mg/lt. Calculate 2 day BOD at 30°C for the same sample, $K_{20} = 0.1$/day. **(06 Marks)**

OR

6 a. Write a detailed flow diagram of a sewage treatment plant for a large city. Indicate the components. **(06 Marks)**

b. With a neat sketch, explain working principle of activated sludge process. **(06 Marks)**

c. Mention the operational problems of trickling filter process. **(04 Marks)**

Module-4

7 a. Mention the differences between domestic waste water and industrial waste water. **(08 Marks)**

b. Write note on:
   i) Volume reduction
   ii) Strength reduction
   iii) Neutralization
   iv) Equalization **(08 Marks)**

OR

8 a. What are the merits and demerits of municipal and industrial waste water combined treatment methods. **(08 Marks)**

b. Briefly explain methods used to removal of organic and inorganic salts from waste water. **(08 Marks)**

Module-5

9 a. With process flow diagram, explain the cotton textile mill wastes origin. **(08 Marks)**

b. Enumerate the effects of discharging paper and pulp industrial wastes into water bodies or sewers. **(08 Marks)**

OR

10 a. With process flow diagram, explain the origin of wastes from Cane Sugar mill. List its characteristics. **(08 Marks)**

b. With a flow diagram, explain the units used for treatment of Dairy waste on receiving stream. **(08 Marks)**

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OR

4 a. Write a note on the following :
i) Sewage sickness
ii) Sewage farming. **(10 Marks)**

b. Using following data find out Dissolved oxygen deficit at the end of First–Day and second day.

Particular	River	Waste water
Flow (m^3/sec)	30	05
5 day BoD (mg/ℓt)	0	200
DO (mg/ℓt)	9.2	0

Take Deoxygenation constant K = 0.1/day, reoxygenation constant R = 0.3/day and Saturation Dissolved oxygen = 9.2 mg/ℓt. **(10 Marks)**

Module-3

5 a. Define Biochemical oxygen demand. List out the limitations of BoD test. **(05 Marks)**

b. Determine ultimate BoD for a sewage having 5-day BoD at 20°C as 160ppm. Assume the deoxygenation constant as 0.2 per day. Also find what will be the 2 day BoD of raw sewage. **(05 Marks)**

c. The sewage flows from a primary settling tank to a standard rate Trickling Filter at a rate of 5 million liters per day having a 5-day BoD of 150 mg/ℓt. Determine the depth and the volume of the filter, adopting a surface loading of 2500ℓ/m^2/day and on organic loading of 165g/m^3/day. Also determine the efficiency of the filter unit, using NRC formula. **(10 Marks)**

OR

6 a. Explain with the aid of neat sketch the construction and working of trickling filter unit. **(10 Marks)**

b. Design a suitable Grit chamber for a sewage treatment plant getting a dry weather flow from a separate sewage system at 400lit/sec. Assume the flow velocity through the tank as 0.2m/sec and detention period of 2 min. The maximum flow may be assumed to be 3 time the dry weather flow. **(10 Marks)**

Module-4

7 a. Explain the effects of effluent discharge on streams. **(10 Marks)**

b. List out the methods adopted for strength reduction and explain any two in detail. **(10 Marks)**

OR

8 a. Explain the methods employed in the removal of suspended solids. **(10 Marks)**

b. Write a note on feasibility of joint treatment of industrial raw waste water with domestic waste water with advantages and disadvantages. **(10 Marks)**

Module-5

9 a. With the aid of neat process flow chart explain the origin of wastewater in a Sugar Industry. **(10 Marks)**

b. Give a typical characteristics of a paper mill waste. Also mention the effects of paper mill waste discharge into streams. **(10 Marks)**

OR

10 a. Explain the treatment process of Tannery waste along with neat flow chart. **(10 Marks)**

b. Describe the process flow chart of cotton textile mill. **(10 Marks)**

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