CBCS SCHEME

USN | | | | | | | | | | |

17CV71

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

Time: 3 hrs. Max. Marks: 100

Note: *1. Answer any FIVE full questions, choosing ONE full question from each module.*
2. Missing data, if any, may be suitably assumed.

Module-1

1 a. Classify the sewers based on the materials of their construction and explain nay two with advantages and disadvantages. **(10 Marks)**

b. A population of 50,000 is residing in a town having an area of 40 hectares. If the average impermeability coefficient for this area is 0.55, and time of concentration of the design rain is 50 minutes, calculate the discharge for which the sewers of a proposed combined system will be designed for the town in question. Use US ministry of health formula for rainfall intensity computation. Assume rate of water supply is 200lpcd and 75% of water supplied will reach the sewers and peak flow of sewage is 3 times the average flow. **(10 Marks)**

OR

2 a. Give the mathematical expression of rational formula for computation of wet weather flow indicating all terms. Also mention the assumptions to be made while computation. **(10 Marks)**

b. Calculate the quantity of sewage for separate and partially separate systems for a town given the following data :

i) Area of the town = 200 hectares
ii) Intensity of rainfall = 50mm/hr
iii) Population density = 300 persons/hectares
iv) Rate of water supply = 200 ℓpacd
v) Peak factor = 3.0
vi) Surface classification :

Type of surface area	% AREA	Impermeability coefficient
Roof	50%	0.9
Paved surface	20%	0.85
Non paved surface	30%	0.30

Assume that 75% water supplied to reach the sewer as waste water. **(10 Marks)**

Module-2

3 a. Explain the factors affecting self purification of streams. **(10 Marks)**

b. A town has a population of 50,000 with a per capita sewage flow rate as 300ℓpcd. Design a sewer running half full depth at peak discharge. The sewer is to be laid at a slope of 1 in 625. Take manning's constant 'N' as 0.012 and peak factor as 3.0. **(10 Marks)**

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)**

* * * * *