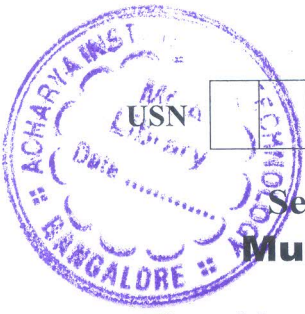


CBCS SCHEME



15CV71

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Seventh Semester B.E. Degree Examination, June/July 2024 Municipal and Industrial Wastewater Engineering

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- Explain briefly the different types of sewerage system. (06 Marks)
 - Explain the various factors affecting the dry weather flow. (04 Marks)
 - The drainage area of one sector of a town is 20 hectares. The classification of the surface of this area is as follows :

% Total surface area	Type of surface	Run – off coefficient
25	Hard pavements	0.85
25	Roof surface	0.80
15	Unpaved street	0.30
25	Gardens and Lawns	0.15
10	Wooded area	0.10

If the time of concentration for the area is 30 minutes. Find the maximum run off. Use the following formula for intensity of rainfall $R = 900/(t + 60)$. (06 Marks)

OR

- Briefly explain the essential requirements of a good sewer material. (04 Marks)
 - Explain with a neat sketch, working of an “oxidation pond”. (06 Marks)
 - Explain with a neat sketch, construction and working of a manhole. (06 Marks)

Module-2

- A 3m diameter circular sewer discharges $3 \text{ m}^3/\text{s}$ of sewage into a pump well. The waste water level in the pump well rises to full depth of 3 m above invert of incoming sewer.. Assuming Manning’s value of 0.012 and gradient of 0.5/1000 determine the velocity of flow and ratio of discharge (q) to full discharge ($Q_{\text{full}} = 10.856 \text{ m}^3/\text{s}$). (05 Marks)
 - Explain the self purification of streams with a Sag curve. (05 Marks)
 - Discuss the various flow-friction formulae used in design of sewers. (06 Marks)

OR

- Find out where critical DO occurs in a fully saturated river (with DO) for the following data:
City discharge = $100 \text{ m}^3/\text{s}$
Minimum river discharge = $1250 \text{ m}^3/\text{s}$; Minimum velocity in river = 0.15 m/s
 $\text{BOD}_{5d, 20^\circ\text{C}} = 260 \text{ mg/L}$; Coefficient of purification of river = 4.0
Coefficient of DO = 0.11
Ultimate BOD = 125% of BOD of mixture of sewage and river water. (05 Marks)
 - Explain the term “Zone of Purification” in a river. (05 Marks)
 - Derive the Streeter-Phelps Oxygen Sag equation in river analysis. (06 Marks)

Module-3

- 5 a. Draw a flow diagram of municipal waste water treatment plant with their operation units. (08 Marks)
b. Briefly explain characteristics of domestic waste water. (08 Marks)

OR

- 6 a. List the difference between activated sludge process and trickling filters. (08 Marks)
b. With sketch explain grit chamber and skimming tank. (08 Marks)

Module-4

- 7 a. Explain the effects of effluent discharge on the stream water quality. (08 Marks)
b. What is meant by strength reduction? Explain the various methods of strength reduction being adopted in the industries. (08 Marks)

OR

- 8 a. List and explain the methods of removal of colloidal solids from wastewater. (08 Marks)
b. Explain the principles of raw and partially treated wastes before discharged into streams. (08 Marks)

Module-5

- 9 a. Explain the effect of dairy waste on receiving streams and give a treatment proposal. (05 Marks)
b. Explain the treatment of cane sugar effluent with the help of a flow chart. (05 Marks)
c. Explain the role of anaerobic stabilization ponds as energy efficient method of treating distillery waste. (06 Marks)

OR

- 10 a. Give the schematic flow diagrams of cotton textile industry showing the generation of wastewater. (05 Marks)
b. Give the typical characteristics of Indian tannery industrial waste water. (05 Marks)
c. Tuna fish canning industry is proposed near the coast. What are the expected operations leading to discharge of waste? Also give the treatment strategy. (06 Marks)

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