



CBCS SCHEME

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Seventh Semester B.E. Degree Examination, Jan./Feb. 2023 Municipal and Industrial Wastewater Engineering

Time: 3 hrs.

Max. Marks: 80

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Draw neat sketches wherever required.*

Module-1

- 1 a. Discuss the factors affecting sewage flow. (06 Marks)
- b. A 300 mm diameter sewer laid at a gradient of 1 in 150 is flowing full. Check whether the velocity is self cleansing for a Manning's $N = 0.013$. Also calculate the discharge. (06 Marks)
- c. Discuss the advantages and disadvantages of combined system of sewerage. (04 Marks)

OR

- 2 a. Draw a neat sketch of oxidation pond and explain the principle of working. (06 Marks)
- b. Draw a neat sketch of a building layout indicating positions of sanitary fittings and house drainage arrangements. (04 Marks)
- c. Calculate the storm water discharge for the following data for a district:
20% area with run off coefficient 0.9
25% area with 0.7, 30% area with 0.45
15% area with 0.25 and remaining area with 0.05.
Area of district = 2.4 Hectares
Maximum intensity of rainfall = 0.25 mm/hr (06 Marks)

Module-2

- 3 a. Design a circular sewer running half full to carry sewage for the following data:
Population of town = 1,50,000
Per capita water demand = 135 Lpcd
Peak flow rate = 2
Slope of sewer = 1 in 400. Take $n = 0.013$
Check whether velocity is self cleansing. (06 Marks)
- b. Give the various hydraulic elements or steps followed for a circular sewer design. (04 Marks)
- c. Write an explanatory note on sewage farming. (06 Marks)

OR

- 4 a. Discuss the oxygen sag analysis/curve with a neat sketch. (06 Marks)
- b. Determine the minimum flow in the stream if the final BOD of stream is not to exceed 30 mg/L for the following data:
Sewage discharge = 1.5 MLD
BOD of sewage = 100 mg/L
Stream water BOD = 10 mg/L (06 Marks)
- c. Give the conditions favorable for land selection before sewage disposal. (04 Marks)

Module-3

- 5 a. Draw a neat flow diagram for the treatment of sewage from a city and note the various unit operations and unit processes. (06 Marks)
- b. Explain the working principle of treatment using a trickling filter with a neat sketch. (06 Marks)

- c. Design a set of circular trickling filter units for treating 5 MLD of sewage.
 BOD of sewage = 150 mg/L, Effective depth = 2 m
 Organic loading = 1500 kg/hectare-mt/day
 Hydraulic loading = 25 million lt/hectares/day

(04 Marks)

OR

- 6 a. Explain briefly the Activated sludge process used in the treatment of sewage. (06 Marks)
 b. With a neat sketch explain the working of a Rotating Bio Contactor (RBC). (06 Marks)
 c. Explain briefly mechanism of sludge digestion. (04 Marks)

Module-4

- 7 a. Distinguish between Industrial and Domestic waste water (Three points on each). (06 Marks)
 b. Discuss the various effects of industrial waste water discharges into water bodies. (06 Marks)
 c. Explain the term re-use and recycling of waste water. (04 Marks)

OR

- 8 a. Explain the advantages of combined treatment of waste water. (06 Marks)
 b. Discuss the term stream sampling. (06 Marks)
 c. Give the BIS standards for discharge of sewage and industrial wastes into surface water sources (Any four parameters only). (04 Marks)

Module-5

- 9 a. With a neat flow diagram explain the treatment of Cotton Textile Mill waste. (06 Marks)
 b. With a neat flow diagram indicate the sources of waste from a tannery. (06 Marks)
 c. Give the typical values of characteristics of sugar industrial waste. (04 Marks)

OR

- 10 a. Discuss the cost recovery methods from distillery effluents. (06 Marks)
 b. A dairy discharges streams of high BOD, low BOD and saline effluents. Give the strategy/type of treatment. (06 Marks)
 c. Discuss briefly the use of various industrial wastes as raw materials for other manufacturing processes. (04 Marks)
