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17CV71

## Seventh Semester B.E. Degree Examination, Feb./Mar. 2022 Municipal and Industrial 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 different types of sewerage system with their advantages and disadvantages. (10 Marks)
- b. With neat sketch, explain the septic tank. (04 Marks)
- c. Explain the basic principles of house drainage system. (06 Marks)

**OR**

- 2 a. The drainage area of one sector of a town is 12 hectares. The classification of the surface of this area is as follows :

% of total surface area	Type of surface	Coefficient of runoff
35	Hard pavement	0.85
10	Roof surface	0.80
20	Unpaved street	0.20
25	Garden and lawn	0.20
10	Wooden area	0.15

If the time of concentration for the area is 30 min, calculate the maximum runoff using

Rational method. use  $i = \frac{900}{t + 60}$ . (08 Marks)

- b. With neat sketch, explain the component parts of a manhole. (06 Marks)
- c. With neat diagram, explain the non – circular sewers. (06 Marks)

### Module-2

- 3 a. Explain the Oxygen Sag Curve. (06 Marks)
- b. Discuss the zones of purification. (08 Marks)
- c. A waste water effluent of 560 l/sec with a BOD = 50 mg/l , DO = 3.0 mg/l and temperature of 23 °C enters a river where the flow is 28m<sup>3</sup>/sec and BOD = 4.0 mg/ l , DO = 8.2 mg/l and temperature of 17 °C.  $K_D$  of the wastewater = 0.10 per day at 20 °C. The velocity of water in the river downstream is 0.18 m/sec and depth of 0.12m. Determine the following after mixing of wastewater with the river water.
  - i) Combined discharge
  - ii) BOD of mixture
  - iii) DO of mixture
  - iv) Temperature of mixture. (06 Marks)

**OR**

- 4 a. A town has a population of 1,00,000 persons with a 200 lpcd. Design a sewer when it is running full at maximum discharge. Take a constant value  $N = 0.013$ . The sewer is to be laid at a slope of 1 in 500. Take peak factor = 3. Use Manning's formula. (10 Marks)
- b. Explain the Self cleansing velocity and non scouring velocity. (06 Marks)
- c. Outline the preventive measures for sewage sickness. (04 Marks)

**Module-3**

- 5 a. Explain Aerobic process and Anaerobic process of decomposition of Organic matter. (06 Marks)  
b. With neat flow diagram, explain the treatment of Municipal Wastewater. (10 Marks)  
c. Briefly explain Screening and its types. (04 Marks)

**OR**

- 6 a. Design a high rate trickling filter for the following data :  
i) Flow : 4.5 Mld ii) Recirculation ratio : 1.4  
iii) BOD of raw sewage : 250 mg/l iv) BOD removed in primary clarifier : 25%  
v) Final effluent BOD desired : 50mg/l.  
Also determine the size of the standard rate trickling filter to accomplish the above requirements. (10 Marks)  
b. Briefly explain :  
i) Activated Sludge Process (ASP) ii) Sequential Batch Reactors (SBR). (10 Marks)

**Module-4**

- 7 a. Outline the differences between Domestic and Industrial waste water. (08 Marks)  
b. Explain the effects of effluent discharge on the stream water quality. (04 Marks)  
c. Define Volume Reduction. Explain the various methods of volume reduction being adopted in the industries. (08 Marks)

**OR**

- 8 a. Explain the process involved in removal of Organic solids. (10 Marks)  
b. List and explain the methods of removal of colloidal solids from waste water. (10 Marks)

**Module-5**

- 9 a. With the help of a flow chart, explain the treatment units suggested to treat waste water from a cotton and textile industry along with waste water characteristics. (10 Marks)  
b. Outline the sources and characteristics of the wastewater from diary industry. (10 Marks)

**OR**

- 10 a. Explain with flow diagram, treatment option for sugar mills. (10 Marks)  
b. With the help of flow chart, mention sources and characteristics of waste water from Pharmaceutical Industry. (10 Marks)

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