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17CV71

## Seventh Semester B.E. Degree Examination, Jan./Feb. 2021 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. Classify the different sewerage systems and discuss the advantages and disadvantage of each system. (09 Marks)
- b. List the factors considered in determining the quantity of Dry Weather Flow. (04 Marks)
- c. Calculate the ratio of DWF and WWF of a city having the following particulars :  
Area = 50000 hectares , Water supply rate = 200 Lpcd , Population =  $20 \times 10^5$  ,  
Intensity of rainfall = 15mm/hour , Average impermeability factor = 0.5.  
80% of the water supplied reaches sewer. Comment on the result. (07 Marks)

**OR**

- 2 a. Explain with neat sketch laying of sewer line. (05 Marks)
- b. Mention the different types of Manholes and explain one of the Manholes, with neat sketch. (07 Marks)
- c. The drainage area of a town is 18 hectares. The surface of this area is

Percent of total surface area	Types of surface	Coefficient of runoff
20 %	Hard pavement	0.85
20 %	Roof surface	0.80
15 %	Unpaved sheet	0.20
30 %	Garden and Lawn	0.20
15 %	Wooded area	0.15

If the time and concentration for the area 40 minutes, find the maximum runoff. (08 Marks)

### Module-2

- 3 a. Calculate the velocity of flow and discharge in a sewer of circular section having a diameter of 1 in 500, when  $N = 0.012$  and the sewer is running half full. (08 Marks)
- b. With a neat sketch, explain Oxygen Sag Curve. (06 Marks)
- c. Explain the preventive measures required to be adopted for sewage sickness of land. (06 Marks)

**OR**

- 4 a. A waste water effluent of 560 L/s with a BOD = 65 mg/L , DO = 4.0 mg/L and temperature  $23^{\circ}\text{C}$  enters a river where the flow is  $28\text{m}^3/\text{sec}$  and the BOD = 4.0 mg/L, DO = 8.2mg/L and the temperature  $17^{\circ}\text{C}$ .  $K_1$  of the waste is 0.10 per day at  $20^{\circ}\text{C}$ . The velocity of water in the river downstream is 0.18m/s depth of 1.2m. Determine the following after mixing of waste water with river water : i) Combined discharge ii) BOD iii) DO iv) Temperature. (08 Marks)
- b. Explain the various techniques adopted in applying sewage effluents to forms. (06 Marks)
- c. Enumerate on dilution method Vs land disposal method for disposal of sewage. (06 Marks)

**Module-3**

- 5 a. The BOD of a sewage sample incubated 1 day at 30°C has been found to be 110mg/L. What will be 5 day at 20°C BOD, if  $K_{(20)} = 0.1/\text{day}$ ? (06 Marks)
- b. Draw the flow diagram of location of unit operations in a waste water treatment plant. (06 Marks)
- c. Design a rectangular grit chamber for a population of 2 lakhs, assuming per capita sewage = 120 L/day, quantity of grit at the rate of 25 L/min and velocity = 0.3m/sec and  $d = 0.2\text{mm}$ . (08 Marks)

**OR**

- 6 a. Design a circular sedimentation tank for the primary treatment of a sewage at 13.5 million lines per day. Check the surface loading. (06 Marks)
- b. List the advantages and disadvantages of activated sludge process. (08 Marks)
- c. Explain sludge digestion process with flow chart. (06 Marks)

**Module-4**

- 7 a. Explain the different techniques required to adopt strength reduction in industrial plant (any five). (10 Marks)
- b. List the various methods of removal of organic dissolved solids (any five). (10 Marks)

**OR**

- 8 a. Mention the advantages of the combined treatment. (08 Marks)
- b. Discuss the acceptable methods for neutralizing excess acidity or alkalinity in waste water. (08 Marks)
- c. Differentiate between effluent standards to stream standards. (04 Marks)

**Module-5**

- 9 a. Explain with a flow chart, the processes of cotton textile industry in manufacturing and the treatment methods adopted for waste water generated. (10 Marks)
- b. With a neat flow diagram, bring out the manufacturing process and sources of waste water generation from sugar cane industry. (10 Marks)

**OR**

- 10 a. Draw the flow sheet for waste water treatment in a large distillery complex by discussing the characteristics of waste. (10 Marks)
- b. For a paper and pulp industry discuss the various steps in generation of waste water during the manufacturing and treatment of the waste water before discharging on receiving water courses or sewers. (10 Marks)

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