

CBCS SCHEME

18CV55



--	--	--	--	--	--	--	--	--	--

Fifth Semester B.E. Degree Examination, Jan./Feb. 2023 Municipal Wastewater Engineering

Time: 3 hrs.

Max. Marks: 100

- Note : 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Assume any missing data.

Module-1

- 1 a. Explain merits, demerits and suitability of Combined system and Separate system of sewerage. (10 Marks)
- b. The following data is available regarding various types of area and the corresponding impermeability factor of a town. Roots 15% , 0.9 , pavements 20% , 0.8 , lawns 40% , 0.15, unpaired 15% , 0.20 , wooded 10% , 0.05. Determine the average co-efficient of runoff if total area of district is 20 hectares , determine the maximum storm water flow for a rainfall intensity of 50mm/hr having a frequency once in 5 years. Use Rational formula. (10 Marks)

OR

- 2 a. What is Sewer Appurtenances? Explain with a neat sketch, components of manhole. (08 Marks)
- b. With a neat sketch, explain various traps of sewer. (08 Marks)
- c. Draw a typical plan showing house drainage connections. (04 Marks)

Module-2

- 3 a. Write a flow diagram, employed for a conventional wastewater treatment plant. Indicate the importance of each unit. (08 Marks)
- b. What is Sampling? Mention the types of Sampling. (04 Marks)
- c. Combined sewer designed to serve area of 60km² with average population of 185 persons/hectare. The total quantity of sewage flow is 350 LPCD. Total storm run – off is 8.33m³/sec. Find the minimum velocity and gradient required to transport coarse sand in sewer of 40cm diameter with sand particles of 1mm diameter. Specific gravity 2.65 , B = 0.04 , f = 0.012 , n = 0.012. (08 Marks)

OR

- 4 a. Explain the various treatment unit operations and process used in waste water. (06 Marks)
- b. Derive an expression showing the nature of BOD reaction using I – order kinetics. (08 Marks)
- c. The BOD of a sewage sample incubated for 5 days at 30°C has been found to be 110mg/L. Calculate BOD₅ at 20°C assuming K₍₂₀₎ = 0.1/day. (06 Marks)

Module-3

- 5 a. With a neat sketch, explain the working of screen and skimming tanks. (10 Marks)
- b. What is Grit Chamber and why is it necessary to provide a grit chamber? Explain the configuration of grit chamber with the help of neat sketch. (10 Marks)

OR

- 6 a. Explain the concept of self – purification phenomenon in natural water. (04 Marks)
 b. Define De – oxygenation and Re – oxygenation. With a neat sketch, explain Oxygen sag curve. (06 Marks)
 c. A city discharges 1500 L/sec of sewage into a stream whose minimum rate of flow is 6000L/sec. The temperature of sewage as well as water is 20°C. The 5 day BOD at 20°C for sewage is 200mg/L and that of river water is 1 mg/L. The DO content of the sewage is zero and that of the stream is 90% of saturation DO. If the minimum DO to be maintained in the stream is 4.5mg/L find out the degree of sewage treatment required. Assume $K_D = 0.1$, $K_R = 0.3$, Saturation DO @ 20°C as 9.17 mg/L. (10 Marks)

Module-4

- 7 a. Explain with a neat sketch, the working of Trickle filter. (10 Marks)
 b. What is meant by Activated Sludge process? Describe with sketch, the treatment of sewage by activated sludge process. (10 Marks)

OR

- 8 a. Mention the modification of Activated sludge process. Explain any four of them. (10 Marks)
 b. Explain the following :
 i) Rotating Biological Contactors ii) Aerobic and Anaerobic Process. (10 Marks)

Module-5

- 9 a. Explain the Nitrification and De – nitrification process in Advanced Wastewater treatment. (08 Marks)
 b. Explain the following Advance Wastewater Treatment Techniques :
 i) Advance Oxidation Processes ii) Electro Coagulation. (08 Marks)
 c. Explain the need for Advance Waste water Treatment. (04 Marks)

OR

- 10 With a neat sketch, explain the following Low Cost Treatment Techniques :
 a. Septic Tank.
 b. Soak Pits.
 c. Two – pit Latrins.
 d. Eco – toilet. (20 Marks)
