BE (Seventh Semester)

Civil Engineering

Environmental Engineering II - 320733(20)

2015 - Winter Session , New Scheme

Chapter 1

1	What do you understand by the 'Conservancy System' and 'Sewerage System'? Describe with advantages and disadvantages.	**2**
2	A 75 cm diameter sewer is to discharge 0.09 cumes at a velocity as self-cleansing as a sewer flowing full at 0.82 m/sec. Find the depth and velocity of flow and the required slope. Take uniform value of N = 0.012.	**7**
3	Derive the hydraulic elements of a circular sewer?	**7**
4	A main sewer is to be designed to carry the combined flow of waste water and strom water of a township spread over an area of 15 sq. km. with an average population of 350 persons per hectare. The average rate of waste water flow can be taken as 220 lpcd and the maximum flow is 120% in excess of the average together with the rainfall equivalent of 10 mm in 24 hr, all of which are runoff. Calculate the discharge for which the sewer is to be designed and find the diameter of the sewer with sewer running half-full. Take n = 0.012 and available slope as 1 in 1000.	**7**

Chapter 2

1	Draw BOD curve for a domestic waste water sample and list various segments on it?	**2**
2	Explain the purpose of the grit chamber. What is the logic that governs its design? Determine the dimensions and detention time for a grit chamber for a maximum waste water flow of 9000 m^3/day to remove particles having average setting velocity of 0.02 m/sec for a constant flow through velocity of 0.3 m/sec maintained by provision of proportional flow weir.	**7**
3	Explain the type-II settling adopted for the design of primary settling column test to determine the relevant data for the design of the PST.	**7**
4	Explain the treatment mechanism in a septic tank and soak pit with sketches. What are the precautions that should be taken while constructing the septic tank to ensure its efficiency?	**7**

Chapter 3

1	Draw the line diagram of Single Stage HRT/F and Double Stage HRT/F?	**2**
2	A single stage filter is designed for an organic loading of 12,000 kg of bod in raw sewage per hectare meter per day with a recirculation ratio of 1.2. This filter treats a flow of 6 MLD of raw sewage with a BOD of 260 mg/l. Using NRC formula determine the strength of the effluent.	**7**
3	The design flow of sewage is 4.8 million litres per day, and the BOD of raw sewage is 240 mg/l. Design a single stage trickling filter to produce an effluent having BOD of 50 mg/l.	**7**

4 Design a conventional sludge plant to treat settled domestic sewage with diffused air aeration system, for the following data : **7**

(a) Population - 1,40,000

(b) Per capita sewage contribution - 190 lped

(c) Settled sewage BOD_5 - 240 mg/l

(d) Effluent BOD_5 required - 35 mg/l

Chapter 4

1 Differentiate the terms "Sewage farming" and "effluent irrigation"? **2**

2 A steam saturated with DO, has a flow of 1.6 m^3/sec. BOD_5 of 4.8 mg/l and rate constant of 0.3 per day. It receives an effluent discharge of 0.32 m^3/sec. With a BOD_5 20mg/l DO = 5.5 mg/l and rate constant 0.13 per day. The average flow velocity of the steam is 0.15 s downstream. Take DO saturation at 20^0C at 9.2 mg/l. **7**

3 A town with a population of 35,000 has to design a sewage treatment plant to handle industrial as well as domestic waste water of the town : **7**

(a) Dairy waste of 4.5 Ml/day with BOD of 1,250 mg/l.

(b) Sugar Mill waste of 305 Ml/day with BOD of 1800 mg/l,

(c) Domestic sewage is produced 240 lped with per capita BOD of 80 gm/day. An overall expension factor of 10%

to be provided. The sewage effluents are to be discharged to a river with a minimum dry weather flow of 4500

litre per second and a saturation DO content of 9.2 mg/l. It is necessary to maintain a DO content of 4.5 mg/l

in river. Determine the degree of treatment required to be given to sewage.

4 Describe the characteristics of waste generated from a sugar factory and also mention the treatment methodology to be adopted for such waste. **7**

Chapter 5

1 Write the percentage composition of various components in a domestic waste of an average Indian city? **2**

2 Write the methods of collection and conveyance of solid wastes in an average Indian city? **7**

3 Explain in detail the solid waste management tools. **7**

4 Explain the terms with regard to SWM : **7**

(a) Zero Waste

(b) Mobius Loop Concept

(c) LCA studies