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10CV71

**Seventh Semester B.E. Degree Examination, July/August 2021**  
**Environmental Engineering – II**

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions.**  
**2. Draw neat figures and wherever necessary.**  
**3. Missing data, if any, may be suitably assumed.**

- 1 a. Need for sanitation is very important in this technological society? Justify your answer. (05 Marks)
- b. Explain what is meant by Infiltration and Ex-filtration process with their importance in the design of sewers. (05 Marks)
- c. What are the factors to be considered in the design of storm water sewers in empirical formulae method? Give the various empirical formulae used to estimate the quantity of storm water. (10 Marks)
- 2 a. Explain briefly the types of velocities to be considered in the design of sewers, give their standard values. (05 Marks)
- b. A city is having a population of 30 lakhs with an area of 1500 hacters receives water supply at a rate of 150 lpcd and 70% of water becomes sewage. The area of the town is categorized into:

| Sl.No. | Type of Area      | Percentage of Total Area | Value of Runoff Coefficient |
|--------|-------------------|--------------------------|-----------------------------|
| 1      | Buildings         | 30                       | 0.90                        |
| 2      | Paved surface     | 30                       | 0.85                        |
| 3      | Unpaved surface   | 10                       | 0.28                        |
| 4      | Lawns and Gardens | 20                       | 0.15                        |
| 5      | Wooded Area       | 10                       | 0.10                        |

Determine the average coefficient off Runoff and Reinfall intensity using time of entry = 6min, and time of flow is 12 minutes. The rate of Ex-filtration in the given area was 6000l/d/ha. Design a combined sewer of circular in section is to be laid to serve this area, if the maximum velocity of flow is 420cm/sec. Assume any data if necessary. (15 Marks)

- 3 a. What are sewer APPurtenances? List out the various categories of the same? With the help of a neat diagram, explain the process of oil and grease separation from sewage in sewerage system with its necessity. (10 Marks)
- b. Explain the functions and types of traps being used in sanitary house drainage systems with a neat diagrams. (10 Marks)
- 4 a. Explain briefly Aerobic and Anaerobic process in sewage treatment system with their by products. (05 Marks)
- b. Explain why DO determine is important in aerobic treatment process of wastewater. (05 Marks)
- c. Calculate the first stage BOD values of Raw and treated Wastewaters, if their 5 day 20°C BOD values are 380mg/l and 20mg/l respectively. The corresponding first order decay rate coefficient are 0.2 per day and 0.1 per day (Base 10). Calculate the efficiency of the treatment unit. (10 Marks)



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- 5 a. Explain with a neat diagram, showing the natural purification process of stream with oxygen balance in a stream pollution studies. (10 Marks)
- b. Discuss the following :
- i) Sewage farming
- ii) Sewage sickness. (10 Marks)
- 6 a. Discuss with the help of a neat flow diagram, showing the details of sewage treatment units and their BOD reduction with type of impurities removal from each unit. (10 Marks)
- b. Explain with the help of a neat sketch, the rectangular sedimentation tank to be used in the treatment of sewage? (10 Marks)
- 7 a. Explain the purification process of sewage by trickling filter with a neat sketch. (10 Marks)
- b. Distinguish between Activated sludge treatment with respect to Trickling filters. (10 Marks)
- 8 a. Write a short notes on the following :
- i) Oxidation pond
- ii) Oxidation ditch. (10 Marks)
- b. Design the dimensions of a septic tank for a students hostel of 300 members provided with water supply of 120 lpcd. The following data is to be considered.
- i) Maximum daily demand of water is three times the average daily demand
- ii) 70% of water supply becomes spent water
- iii) Detention period of 36 Hours
- iv) Length to breadth ratio is 1 : 3
- Draw a line diagram showing the designed dimension of the septic tank. (10 Marks)

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