

# CBCS SCHEME

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## Fifth Semester B.E. Degree Examination, June/July 2023 Municipal 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 necessity and importance of sanitation. (06 Marks)
- b. Discuss the methods for estimating the storm water. (08 Marks)
- c. Define time of concentration and explain the methods to calculate the  $t_c$ . (06 Marks)

OR

- 2 a. Explain the shapes of sewers with sketches. (08 Marks)
- b. Explain the procedure for laying of sewers on ground and different types of test for sewer water tightness. (06 Marks)
- c. With the sketch enumerate the principle of house drainage work. (06 Marks)

### Module-2

- 3 a. With appropriate equations, explain self cleaning and non scouring velocity in sewers and their importance. (06 Marks)
- b. Discuss the hydraulic characteristics for a circular sewer running partial full conditions. (06 Marks)
- c. The rain sewer was designed for an area of 50 km<sup>2</sup>. Density of population of the town is 200 persons/hectares. The average flow is 250 lpcd. The peak discharge is one and half times more than average flow. Rainfall equivalent of 8 mm in 24 hours all of which is runoff:  
(i) What is capacity of sewer? (ii) Find minimum velocity and gradient. Take sewage containing sand of 1 mm dia, sewer dia 35 cm,  $s = 2.65$ ,  $K = 0.06$ ,  $f = 0.03$ . Manning's  $n = 0.012$ . (08 Marks)

OR

- 4 a. Explain the sampling techniques and method for collection sewage samples. (06 Marks)
- b. Discuss the physical, chemical characteristics of sewage. (06 Marks)
- c. Explain the process of waste water treatment for municipal waste with flow diagram. (08 Marks)

### Module-3

- 5 a. Explain the bar screen with the sketches. (06 Marks)
- b. Briefly explain the different types of grit chamber. (08 Marks)
- c. Enumerate the design considerations of settling tank. (06 Marks)

OR

- 6 a. Discuss self purification process and oxygen sag curve with neat sketch. (08 Marks)
- b. What are the methods of sewage application on land and explain sewage farming? (08 Marks)
- c. A town having population of 50,000 and the rate of water supply as 160 l/day, disposes off its sewage successfully by land treatment. The area of land available is 180 hectares. If 80% of water supplied is converted into sewage. Find out the consuming capacity of soil. Consider 50% as extra area for rotation. (04 Marks)

**Module-4**

- 7 a. Explain process involved in trickling filter with neat sketch. (06 Marks)  
b. Explain the activated sludge process with flow diagram. (08 Marks)  
c. What are the stages anaerobic sludge digestion? Explain with sketch. (06 Marks)

**OR**

- 8 a. Explain mechanism of purification in stabilization ponds with sketches. (08 Marks)  
b. Explain process in oxidation ditches and advantages and disadvantages. (08 Marks)  
c. Discuss the functions of sludge drying beds and different components. (04 Marks)

**Module-5**

- 9 a. Explain advanced oxidation process for waste water treatment. (08 Marks)  
b. Discuss the process of electro coagulation for advanced waste water treatment. (06 Marks)  
c. Explain the process of nitrification and dinitrification. (06 Marks)

**OR**

- 10 a. Explain low cost treatment of sewage. (05 Marks)  
b. With the sketch, explain the components of septic tank. (10 Marks)  
c. Discuss the functions of ECO toilet and soak pit. (05 Marks)

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