

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



P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Sixth Semester, B.E. - Civil Engineering

Semester End Examination; May/June - 2018

Waste Water Treatment

Time: 3 hrs

Max. Marks: 100

Note: i) Answer FIVE full questions, selecting ONE full question from each unit.

ii) Missing data, if any, may be assumed suitably.

UNIT - I

- 1 a. Explain briefly the different types of sewerage system and state their merits and demerits. 8
- b. Define dry weather flow and explain the factors affecting dry weather flow. 6
- c. A certain district of a city has a projected population of 50,000 residing over an area of 40 hectares. Find the design discharge for the sewer line, for the following data:
- i) Rate of water supply = 200 LPCd
- ii) Average impermeability coefficient for the area = 0.3
- iii) Time of concentration = 50 minutes 6
- The sewer line is to be designed for a flow equivalent to wet weather flow plus twice the DWF. Use U.S. ministry of health formula. Assume that 75% of W/S reaches in a sewer as waste water.
- 2 a. Explain the rational method of estimating storm water flow. Explain the various parameters used in this method. 6
- b. Explain different shapes of sewers and their application with neat sketches. 8
- c. A stone ware sewer 30 cm in dia is laid in a gradient of 1 in 100. Using $N = 0.013$ in Manning's formula, calculate the velocity, discharge and Chezy's coefficient when the sewer is running full. 6

UNIT - II

- 3 a. Brief explain the factors considered for selecting sewer materials and list the sewer materials commonly used. 8
- b. Briefly explain different tests for testing of sewer lines. 6
- c. Write a note on ventilation and cleaning of sewers. 6
- 4 a. With a neat sketch, explain working of automobile flushing tank. 8
- b. Write the advantages and disadvantages of centrifugal and reciprocating pumps. 8
- c. Write the typical layout plan showing home drainage connections and maintenance of home drainage. 4

UNIT - III

- 5 a. With examples, explain the concepts of Aerobic and Anerobic stabilization with respect to waste water. 6
- b. Define BOD. Deduce the expression for 1st stage BOD. 8
- c. Determine the 1-day BOD and estimate first stage BOD for waste water whose 5-day BOD is 200 mg/l. The reaction constant K (base e) is 0.23/day. 6
- 6 a. Discuss fully the action involved in self-purification process of water bodies. 8
- b. With a neat sketch, explain different zones of pollution in water bodies. 6
- c. Explain the following : 6
- i) Sewage farming ii) Sewage sickness.

UNIT - IV

- 7 a. With a flow diagram, explain a conventional sewage treatment plans and discuss the functions of each unit. 8
- b. With a neat sketch, explain working of circular sedimentation tank. 6
- c. Design a primary settling tank of rectangular shape for a town having a population of 50,000 with a water supply of 180 LPCd. Assume 80% of water supply is converted into waste water and assume any other missing data suitably. 6
- 8 a. With some examples, explain suspended and attached growth system in biological treatment of waste water. 6
- b. With a neat sketch, explain the construction and working of trickling filter. 8
- c. Design high rate tricking filter for the following data : 6
- i) Sewage flow = 5 MLD ii) Recirculation Ratio = 1.5
- iii) BOD of Raw sewage = 230 mg/l iv) BOD removal = 30%
- v) Final effluent BOD desired = 25 mg/l

UNIT - V

- 9 a. With the help of flow diagram, explain the working of activated sludge process. 8
- b. Mention modification of ASP and explain any two of them. 8
- c. Briefly explain Carbon cycle. 4
10. Write short notes on : 20
- a) Sludge Digester b) Sludge drying beds
- c) Oxidation ditches d) Types of Screens

* * * *