



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

(An Autonomous Institution affiliated to VTU, Belagavi)

Eighth Semester, B.E. - Civil Engineering

Semester End Examination; June - 2017

Industrial Wastewater Treatment

Time: 3 hrs

Max. Marks: 100

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

ii) Missing data may be assumed suitably.

UNIT - I

- 1 a. With the aid of a neat sketch, explain the zone of pollution. 10
- b. Derive an expression for critical oxygen deficit 10
- 2 a. Highlight the merits and demerits of wastewater disposed to streams and on land. 10
- b. An industrial wastewater treatment plant discharges secondary effluent to a surface stream. The wastewater is found to have a maximum flow rate of 15,000 m³/day, a BOD₅ of 40 mg/L, a dissolved oxygen concentration 2 mg/L and a temperature of 25°C. The stream is found to have a minimum flow rate of 0.5 m³/s, a BOD₅ of 3 mg/L, DO of 8 mg/L and a temperature of 22°C. Complete mixing of the wastewater and stream is instantaneous and the velocity of the mixture of 0.2 m/s. Assume $K_a = 0.4/\text{day}$ and $K_d = 0.23/\text{day}$ for 20°C condition $C_S = 8.7 \text{ mg/L}$. Determine the critical deficit and its location. 10

UNIT - II

- 3 a. Briefly explain the factors to be considered in stream sampling programme. 10
- b. Enumerate and explain the importance of pretreatment of waste. 10
- 4 a. Briefly explain the various methods of volume reduction of industrial wastewater. 10
- b. Discuss the uses of strength reduction and flotation in treating the industrial wastewater. 10

UNIT - III

- 5 a. With flow diagram, explain the classes of trickling filter. 10
- b. Explain joint treatment of raw industrial waste with municipal wastewater. Bring out the advantages of the same. 10
- 6 a. Discuss about the significance of models in management of effluents. 10
- b. An ASP is to use for secondary treatment of 10,000 m³/d of industrial wastewater. After primary clarification, the BOD is 150 mg/L and it is desired to have not more than 5 mg/L of soluble BOD in the effluent. Assume MLSS = 3000 mg/L, $\theta_C = 10$ days, $Y = 0.5 \text{ kg/kg}$, $K_d = 0.05/\text{day}$ and an underflow concentration of 10,000 mg/L from the secondary clarifier. Determine;
- (i) Volume of the reactor (ii) The recycle ratio. 10

UNIT - IV

- 7 a. Explain the sources of waste in dairy and its effects on the receiving streams. 10
- b. Sketch the manufacturing flow diagram for a sugar industry and explain the treatment of its waste. 10
- 8 a. Write a composition of cotton textile mill waste and woolen textile mills waste. 8
- b. Explain the effects of raw waste water disposition streams : 12
- (i) Cotton textile industry (ii) Sugar industry.

UNIT - V

- 9 a. With the flow diagram, explain the manufacturing process of pulp and paper mill. 12
- b. Discuss about the origin and characterizing distilleries waste. 8
- 10a. Explain the treatment of distillery waste with flow diagram. 10
- b. Briefly explain the effects of distillery waste and paper industry waste on receiving streams. 10

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