[Total No. of Questions - 9] [Total No. of Printed Pages - 3]

Dec-25-0223

CE-603 (Environmental Engineering-II)

B.Tech. 6th (CBCS)

Time : 3 Hours **Max. Marks : 60**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions selecting at least one question each from Unit I, II, III, IV. Unit V is compulsory.

UNIT - I

1. What is BOD and COD of waste water sample? What is the significance of finding these values? How shall you estimate the values of BOD and COD of wastewater? (10)

2. Explain in detail about the various types and shape of sewers and the hydraulics of flow in these sewers i.e. velocity, friction, depth of flow etc. Also, explain what is dry weather flow? (10)

UNIT - II

3. (a) How do a septic tank and Imhoff tank treat sewage? Under what circumstances each type of treatment is preferred? Compare them for function and performance. (5)

   (b) Design a septic tank for a hostel of 180 persons. The desludging period be taken as one year and length to breadth ratio as 2.75:1. Take peak discharge of 225 l_{pm} surface area @ 0.95 m^2 for every 10 L_{pm} of peak flow rate. Also design a soil absorption system dispersion trench for the disposal of the septic tank effluent, assuming the percolation rate as 120 $l/m^2/d$. Assume any suitable missing data. (5)

4. (a) Write in detail about the activated sludge process of waste water treatment. Explain gravity thickening and air floatation unit with a neat diagram. Also explain the working of a standard rate sludge digestor. (5)

   (b) Design an Imhoff tank for a town with population 40000 people. The sewage is generated at the rate of 145 litres per head per day. Assume suitable data if needed. (5)

UNIT - III

5. Explain the design of a separate sewer through Manning's formula. How will you choose the flow conditions for different types of sewers i.e. separate, storm and combined sewer? (10)

6. Write in detail about the plumbing system for buildings. Also explain the one pipe and two pipe system in detail. (10)

UNIT - IV

7. What are various methods of waste water disposal? Compare their merits and demerits. What standards are adopted for this purpose? How will you ensure a safe sewage effluent for irrigation? (10)

8. A town discharges 16 million litres per day of sewage at a temperature of 23 degree Celsius into a river having flow of 1.cum/sec and water temperature of 18 degree Celsius. BOD_5 at 20 degree Celsius for the wastewater is 165mg/l and K(base 10) is 0.15 per day. If R is 0.25 per day, what is the critical oxygen deficit and the distance at which it occcurs? Assume the stream as 90% saturated with oxygen before the sewage addition, the solubility of oxygen at 18 degree Celsius as 8.0 mg/l, and river flow velocity as 0.15m/sec. (10)

UNIT - V (Compulsory)

9. Write briefly:

(i) What is meant by sludge volume index?

(ii) How do you remediate sewage sickness?

(iii) What is meant by slude recycle?

(iv) Why are sewers circular in shape?

(v) What is onsite sanitation?

(vi) What is Sewage farming?

(vii) What is an Aerated lagoon?

(viii) What is the composition of waste water?

(ix) Write any two differences between aerobic and anaerobic treatment of sewage.

(x) What is the purpose of laying intercepting traps?

(10×2=20)