[Total No. of Questions - 9] [Total No. of Printed Pages - 4] (2125)

15238

B. Tech 7th Semester Examination

Sewerage & Sewage Treatment (OS)

CE-7003

Time : 3 Hours **Max. Marks : 100**

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 any one question from each of the section A, B, C, D & all the questions from section E.

SECTION - A

1. (a) State the importance of design & planning of a sewerage system. What are different components used in a sewerage system? (10)

   (b) Define separate & combined sewerage system & explain their advantages & disadvantages. (10)

2. (a) Write short notes on:

   (i) Egg shaped sewer section.

   (ii) Variations in sewage quantity. (5+5=10)

   (b) A 350 mm dia sewer is to flow at 0.45 depth on a gradient ensuring self-cleaning velocity equivalent to that obtained at full depth at velocity 0.7 m/s. Assuming roughness coefficient = 0.013, determine:

   (i) Required gradient.

   (ii) Associated velocity.

   (iii) Discharge rate at partial depth. (10)

[P.T.O.]

SECTION - B

3. (a) Write short notes on:

   (i) Dissolved Oxygen.

   (ii) Effect of oil & grease in sewer lines. (5+5=10)

   (b) Why sewage analysis is important? Briefly explain the methods for sampling of sewage. (10)

4. (a) Write short notes on:

   (i) Solids in sewage.

   (ii) First stage BOD. (5+5=10)

   (b) A sewage sample was found to have 5 day BOD of 300 mg/l at 30°C. Find 3 day BOD value of the sample at 37°C. Take Kd = 0.1/day at 20°C. (6)

   (c) The average standard 5 day BOD of domestic sewage generated from a city is 0.09 kg/person/day. If the population equivalent is 4500, then what will be the 5 day BOD value of industrial sewage generated from the same city? (4)

SECTION - C

5. (a) Write short notes on:

   (i) Imhoff tank.

   (ii) Grit removal unit. (5+5=10)

   (b) What are the aeration methods involved in activated sludge process? Describe any one of them. (10)

6. (a) Write short notes on:

   (i) Sludge drying bed.

   (ii) Determination of sludge Volume Index. (5+5=10)

(b) Design a septic tank for a college hostel having 200 students. Consider water supply rate = 130 lpcd and de-sludging period = 1 year. Also design soil absorption system for disposal of the effluent. (10)

SECTION - D

7. (a) Write short notes on:

(i) Sludge digestion

(ii) Sewage farming (5+5=10)

(b) Explain self-purification process with diagram. Also discuss the various factors affecting the process. (10)

8. (a) Write short notes on:

(i) oxygen sag curve

(ii) Methods of using sewage effluents into land. (5+5=10)

(b) A sewage effluent of 500 lt/sec with BOD = 40 mg/lt, DO = 2.0 mg/lt and temperature of 25°C enters a stream where flow is 20 cum/sec, BOD = 4.0 mg/lt, DO = 8.0 mg/lt and temperature is 17°C. k1 of the sewage is 0.1 per day at 20°C. The velocity of downstream water is 0.15 m/sec and depth is 1.3 m. Determine the following after mixing of the effluent with stream water: .

(i) Combined discharge.

(ii) BOD of mix.

(iii) DO of mix.

(iv) Temperature of the mix. (10)

[P.T.O.]

SECTION - E

9. Define the following terms:

(a) Population Equivalent.

(b) Self-cleaning velocity.

(c) F/M ratio.

(d) Recirculation ratio in ASP.

(e) Sewage sickness.

(f) BOD/COD ratio.

(g) Self-purification constant.

(h) Indian standards for disposal of effluents.

(i) Solid retention time.

(j) Design Period. (2×10=20)