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Dec.-22-0235

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 four questions selecting one question from Section A, B, C and D. Section E is compulsory.

SECTION - A

1. (a) The 5 day 30°C BOD of sewage sample is 110 mg/l. Calculate its 5 days 20°C BOD. Assume the deoxygenating constant at 20°C, K_{20} as 0.1. (5)

   (b) What is difference between separate and combined system of wastewater collection? (5)

2. (a) The following observations were made on a 3% dilution of waste water:

   (i) Dissolved oxygen (D.O.) of aerated water used for dilution = 3 mg/l

   (ii) Dissolved oxygen (D.O.) of diluted sample after 5 days incubation = 0.8 mg/l

   (iii) Dissolved oxygen (D.O.) of original sample=0.6mg/l

   Calculate the BOD of 5 days and ultimate BOD of the sample assuming that the deoxygenation coefficient at test temp is 0.1. (5)

   (b) State the different material and shapes of which the sewers are made, and explain their merits and demerits. (5)

SECTION - B

3. Determine the size (area and diameter) of a high rate trickling filter for the following data. Calculate the size of the conventional trickling filter to accomplish the above requirement. (10)

Flow	4.5 MLD
Recirculation ratio	1.4
BOD of raw sewage	250 mg/l
BOD removed in primary clarifier	25%
Final effluent BOD desired	50 mg/l

4. Explain the working of trickling filter with the help of diagram. (10)

SECTION - C

5. (a) A 350 mm diameter sewer is to flow at 0.35 depth on a grade ensuring a degree of self-cleansing equivalent to that obtained at full depth at a velocity of 0.8m/sec. (5)

   Manning's Coefficient = 0.014,

   Proportionate area = 0.315

   Proportionate wetted perimeter = 0.472

   Proportionate HMD (r/R) = 0.0.7705

   Find:

   i. the required grade

   ii. Associated velocity

   iii. The rate of discharge at this depth

(b) A 20 cm diameter sewer is laid at a slope of 0.004 and is designed to carry a discharge at a depth of 10cm with manning's n=0.014. What will be the design discharge? (5)

6. What is an intercepting trap, and where it is used in a house drainage system? Explain its location with a neat sketch. (10)

SECTION - D

7. Enumerate the two general methods adopted for sewage disposal; and discuss their merits and demerits explaining the conditions favorable for their adoption. (10)

8. What is De-oxygenation, Re-oxygenation and oxygen deficit curve? How they are related to each other? (10)

SECTION - E
(Compulsory Question)

9. (a) What is first stage and second stage BOD?

(b) What is difference between attached growth and suspended growth system?

(c) What is hydraulic mean depth? Derive formula for proportionate area.

(d) Define sludge age.

(e) What is inverted syphons?

(f) Draw a flow chart for high rate trickling filter.

(g) What is difference between q and p type traps?

(h) What is inverted syphons?

(i) What is suspended solids?

(j) What is BOD, COD and TOD? (10×2=20)