10CV71

Seventh Semester B.E. Degree Examination, Dec.2017/Jan.2018
Environmental Engineering - II

Time: 3 hrs.   Max. Marks:100

Note: 1. *Answer any FIVE full questions, selecting*
atleast TWO questions from each part.
2. *Assume any suitable missing data.*

PART – A

1   a. Define Dry Weather Flow and explain the various factors affecting the dry weather flow.
                                                                                  (05 Marks)
     b. Differentiate between Conservancy system and Water carriage system.   **(05 Marks)**
     c. A population of 50,000 is residing in a town having an area of 100 hectares. If the average impermeability coefficient for this area is 0.55, and time of concentration of the design rain is 40 minutes, calculate the discharge for which the sewers of a proposed combined system will be designed for the town in question. Assume rate of water supply is 150 ℓpcd and 80% of water supplied will reach the sewers and peak flow of sewage is 3 times the average flow. Use US Ministry of Health formula for calculating rainfall intensity.   **(10 Marks)**

2   a. Explain the factors to be considered while selecting the sewer material. What are the commonly used sewer materials?   **(06 Marks)**
     b. Briefly explain any two testing of sewer lines.   **(04 Marks)**
     c. A town has a population of one lakh with a per capita average sewage flow as 300 ℓpcd. Design a sewer running 0.6 times full depth at peak discharge. The sewer is to be laid at a slope of 1 in 625. Take Manning's N as 0.013 and peak factor as 3.   **(10 Marks)**

3   a. With neat sketches, explain the following sewer appurtenances :
        i) Deep manhole   ii) Automatic flushing tank.   **(10 Marks)**
     b. Explain the basic principles considered in house drainage work.   **(10 Marks)**

4   a. Define BOD. Deduce an expression for the first stage BOD.   **(10 Marks)**
     b. Calculate 3 day BOD and ultimate BOD of a sample of sewage for the following test data :
        i)   DO of raw sewage = 0.6 mg/ℓ   ii)   DO of dilution water = 6mg/ℓ
        iii) DO of mix of dilution water and sewage after 3 days of incubation = 1.1 mg/ℓ.
        iv) Dilution ratio = 3%. Assume K_D = 0.12/day at test temperature.   **(10 Marks)**

PART – B

5   a. Explain the phenomena of self purification of streams. What are the factors affecting self purification process.   **(08 Marks)**
     b. Disposal by dilution is adopted for a city which discharges 150m^3/S of sewage into a river which is fully saturated with oxygen and is flowing at the rate of 1000m^3/s during its lean period with a velocity of 0.2m/s. The 5 – day BOD of the sewage is 300mg/ℓ. Find when and where the critical DO deficit will occur in the downstream and what is its amount. Assume f = 4 , K_D = 0.1/day and saturation DO = 9.2mg/ℓ.   **(12 Marks)**

6 a. Explain the working of a Grit chamber and Skimming tank with figures. **(10 Marks)**

b. Design a primary sedimentation tank of circular cross – section, for a sewage of 10MLD, detention period of 2 hours and assume the surface loading rate to be $30m^3/m^2/d$. **(10 Marks)**

7 a. Explain the working of conventional activated sludge process (ASP) with flow diagram. **(10 Marks)**

b. The average flow of a sedimented sewage is 4.5 MLD and have its 5-day BOD as 150mg/ℓ. The sewage is ready to be applied on a standard rate trickling filter. The surface loading is 3000 $\ell/m^2/d$ and the organic loading is $150gm/m^3/d$. Determine the volume, depth and efficiency of the standard rate trickling filter. **(10 Marks)**

8 Write notes on :
   a. Sludge digestion tank.
   b. Oxidation ditch.
   c. Reuse and Recycle of wastewater.
   d. Sludge drying bed.

(20 Marks)

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