KUMARAGURU
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Register Number:……..

B.E DEGREE EXAMINATIONS: NOV / DEC 2014

(Regulation 2009)

Sixth Semester

CIVIL ENGINEERING

CEE117: Environmental Engineering II

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. If D is the diameter of the upper circular portion, then the overall depth of standard egg-shaped section is

   a) D b) 1.2D

   c) 1.5D d) 2D

2. The characteristics of fresh and septic sewage are ------ respectively

   a) Alkaline and Acidic b) Acidic and Alkaline

   c) Both acidic d) Both Alkaline

3. For a grid chamber, if the recommended velocity of flow is 0.25m/sec and detention period is 2 mts then the length of the tank should be

   a) 12.5m b) 25m

   c) 20m d) 30m

4. Secondary sewage treatment involves

   a) Dilution of sewage by water b) Sewage forming

   c) Activated sludge process d) All of these

5. The gas which is generally presented in the sewers is

   a) H_2S b) CO_2

   c) CH_4 d) All of these

6. Which of the following sewage treatment methods has inherent problems of odour, ponding, and fly nuisance?

   a) UASB system b) Activated sludge process

   c) Trickling filters d) Stabilization ponds

7. The relative stability of the sewage sample whose dissolved oxygen is same as the total oxygen required to satisfy the BOD is

   a) 1 b) 10

   c) 100 d) 1000

8. Standard 5 days BOD at 20^0C when compared to ultimate BOD is about

   a) 58% b) 68%

   c) 98% d) 78%

9. Length of the main or truck sewer between the connection of the lowest branch at the final point of disposal is known as

   a) Common sewer b) Outfall sewer

   c) Depressed sewer d) Latest sewer

10. A sewer which gets its flow from a number to transfer sewer is known as

   a) Interconnector b) Head sewer

   c) Branch sewer d) Interceptor

PART B (10 x 2 = 20 Marks)

11. Find the ratio of the diameter of the circular section and side of the square section when both sections are hydraulically equivalent.
12. What do you understand by the term Self Cleaning Velocity?
13. Write the limitations of BOD test.
14. If BOD of town is 10,000 kg/day and BOD of the domestic sewage per capita per day is 0.2kg .Find the population equivalent of the town.
15. Differentiate the reactors: - UASBR and SBR.
16. Define the term Cultural Eutrophication.
17. Find the sludge volume index when the half liter of sewage allowed to settle for 30 mts gives a sludge volume of $15cm^3$.Take dry weight of the sludge as 3 gms.
18. List out the factors affecting the sludge digestion process.
19. What is meant by anti-siphonage pipe?
20. What do you understand by the term strength or effectiveness of traps in a drainage system?

PART C (5 x 14 = 70 Marks)

21. a) (i) A population of 50,000 is residing in a town having an area of 60 hectares. If the average coefficient of run off for this area is 0.6 and the time of concentration of the design rain is 30mts.Calculate the discharges for which the sewers of a proposed combined system will be decided for the town. Take per capita water (8)

supply demand as 120 LPCD.Assume 80% of the water supply will be reaching the sewers as sanitary sewage. Assume maximum sewage discharge as three times the average daily discharge use Rational formula for computing the storm water discharge.

(ii) Explain the types of Sewerage system with any two merits and demerits of each system. (6)

(OR)

b) (i) Determine the size of a circular sewer for a discharge of 800 LPS running half full. Take slope as (i) as 0.001 and Manning's (n) as 0.015. (8)

(ii) Describe in order the various stages in the constructions of sewers. (6)

22. a) (i) Design a rectangular primary settling tank for a town of population 75,000 with a water supply rate of 180 LPCD.Assume 80% of the water supply to the town becomes sewage. Take flow velocity as 0.3m/minute Assume water depth in the tank as 3 m and free board as 0.5m (8)

(ii) What do you understand by grid chambers? Why it is necessary to provide a grid chamber? Differentiate the grid chamber and detritus tanks. (6)

(OR)

b) (i) Design a septic tank for a colony of 200 people. The colony is supplied water at a rate of 150 liters/person/day. Assume a detention period of 24 hours and 75% of the water becomes wastewater. The tank is cleaned once in a year. The rate of deposition of sludge is 40 liters/person/year. Depth of tank is to be kept as 2.0m.Provide a free board of 0.3m.Length to breadth ratio may be kept as 3:1. (8)

(ii) Define the terms Aeration Period, Food to Microorganism Ratio, Sludge Age with respect to Activated Sludge Process (ASP) design. (6)

23. a) (i) The sewage is flowing at the rate of 6 MLD from a primary clarifier to a standard rate tickling filter. The 5 day BOD of the influent is 200 mg/l.The value of the adopted organic loading is to 180g/m^3/day and surface loading rate as 2000 lts/m^2/day. Determine the volume of the filter and its depth.Also calculates the efficiency of the filter unit. (8)

(ii) Differentiate Conventional and High Rate Anaerobic Systems with examples. (6)

(OR)

b) (i) Explain how you would decide the type of treatment to be given for a particular sewage with an example. (8)

(ii) List out the advantages and drawbacks of UASBR. (6)

24. a) (i) A town discharges 100 cumecs of sewage in to a stream having a rate of flow of 1500 cumecs during lean days, at a 5-day BOD of sewage (20^0C) is 300 mg/l.Find the amount of critical DO deficit and its location in the downstream portion of stream. Take deoxygenation coefficient K as 0.1 and coefficient of self purification (f_s) as 4.0.Assume saturation DO at 20^0C is 9.2 mg/l and DO of the sewage as 2 mg/l. (8)

(ii) Write a brief note on sludge conditioning. Why elutriation is necessary before chemical conditioning? (6)

(OR)

b) (i) Explain with the help of the flow chart various processes involved in the sludge treatment and disposal. (8)

(ii) List out and explain the various stages in the sludge digestion process. (6)

25. a) (i) Compare and contrast one pipe system and two pipe system of plumbing for house drainage. (8)

(ii) What are traps and why are they provided? How can the water seal in traps is broken? What methods are to be employed to maintain the water seal in traps? (6)

(OR)

b) (i) Explain various principles that should be kept in mind while designing a house drainage system. (8)

(ii) List out and explain any four sanitary fittings that are commonly used in buildings. (6)

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