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10CV71

Seventh Semester B.E. Degree Examination, May 2017
Environmental Engineering – II

Time: 3 hrs. Max. Marks:100

Note: ***1. Answer any FIVE full questions, selecting atleast TWO questions from each part.***
2. Any missing data may be suitably assumed.

PART – A

1 a. Briefly explain the following :
(i) Infiltration and exfiltration
(ii) Time of concentration and its significance. **(10 Marks)**

b. The rate of water supply to a city having covering an area of 36 hectares having a population of 250/hectare is 225 lpcd. 80% of which flows out as sewage. Maximum rain intensity is taken as 5 cm/hr. Calculate
(i) Total runoff of the area
(ii) Peak rate of sewage flow.
The area of the city classified as follows:

Sl.No.	Nature of surface	% of total area	Run off coefficient
1	Water tight roofs	20	0.9
2	Hard pavement	20	0.85
3	Paved yard	5	0.80
4	Macadam roads	15	0.40
5	Garden and Lawn	35	0.10
6	Wooded area	5	0.05

(10 Marks)

2 a. Briefly explain the essential requirements of a good sewer material. **(10 Marks)**

b. Design a sewer to serve a population of 36000. The water supplied at a rate of 135 lpcd of which 80% finds its way into the sewer. The slope available for the sewer to be laid is 1 in 625 and sewer should be designed to carry four times the dry weather flow when running full. What would be the velocity of flow in the sewer when running full? n = 0.012 in Manning's formula. **(10 Marks)**

3 a. With neat sketch, explain the following :
(i) Inverted Siphon (ii) Different types of traps. **(10 Marks)**

b. Explain in detail drainage plan two pipe system with neat sketch and principles of house drainage. **(10 Marks)**

4 a. What is BOD? Briefly explain the stages in BOD with neat sketch. **(10 Marks)**

b. Calculate the 1st day 37°C BOD of sewage sample whose 5 day 20°C BOD is 100 mg/*l*. Assume k_D at 20°C as 0.1. **(06 Marks)**

c. What is sampling? Mention different types of sampling. **(04 Marks)**

PART – B

5 a. What is meant by self purification of streams? With neat sketch explain oxygen sag curve with different zones. **(10 Marks)**

b. A city discharges 100 cumec of sewage into a river, which is fully saturated with oxygen and flowing at a rate of 1500 cumec during its lean days with a velocity of 0.1 m/sec. The 5-days BOD of sewage at the given temperature is 280 mg/*l*. Find when and where the critical D.O. deficit will occur in the downstream portion of the river and what is its amount. Assume self purification of the stream (f) as 4.0 and coefficient of de-oxygenation (k_D) as 0.1. **(10 Marks)**

6 a. With neat sketch explain the following :
(i) Grit chamber (ii) Skimming tank **(10 Marks)**

b. Design a suitable rectangular sedimentation tank (provided with mechanical cleaning equipment) for treating the sewage from a city provided with assured public water supply system with a maximum daily demand of 12 MLD. Assume detention period of 2 hours and velocity of flow as 0.3 m/minutes and 80% of water supplied will become sewage. **(10 Marks)**

7 a. With neat sketch explain the operation of trickling filter process. **(10 Marks)**

b. Design the activated sludge unit treatment with the following data for a town of population of 65,000
(i) Average sewage flow = 210 *l*/c/day
(ii) BOD of the raw sewage = 210 mg/*l*
(iii) Suspended solid in raw sewage = 300 mg/lit
(iv) BOD removal in primary treatment = 40%
(v) Overall BOD removal desired = 90% **(10 Marks)**

8 Write short notes on :
a. Septic tank
b. Oxidation pond
c. Sludge digestion tank
d. Recycle of waste water. **(20 Marks)**

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