CBCS SCHEME

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18CV55

Fifth Semester B.E. Degree Examination, Dec.2023/Jan.2024
Municipal Waste Water Engineering

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain the need for sanitation and factors affecting dry weather flow. **(08 Marks)**

b. The drainage area of one section of a town is 20 hectares. The classification of the surface of this area is as follows:

% of total surface area	Type of surface	Runoff Coefficient
25%	Hard Pavement	0.85
25%	Roof Surface	0.80
15%	Unpaved Streets	0.30
25%	Gardens and lawns	0.15
10%	Wooded Area	0.10

If the time of concentration for the area is 30 minutes, find the maximum runoff. Use the following formula for intensity of rainfall

$$R_i = \frac{900}{t+60}$$ **(12 Marks)**

OR

2 a. Explain (i) Lamp Manhole (ii) Catch Basin **(08 Marks)**

b. A certain city has a population of 50,000 residing an area of 40 hectares. Find the design discharge for the sewer line, with the following data:
(i) Demand = 200 LPCD
(ii) Avg tempermeability coefficient for entire area = 0.3
(iii) Time of concentration = 50 minutes
The sewer line is to be designed for a flow equivalent to the wet weather flow (W.W.F) plus twice the Dry Weather Flow (D.W.F). Use U.S. Ministry of Health formula. Assume that 75% of water supply reaches in sewer as wastewater. **(12 Marks)**

Module-2

3 a. Explain self cleaning and non-scouring velocity. **(08 Marks)**

b. A stone-ware sewer, 30 cm in diameter is laid at a gradient of 1 in 100. Using N = 0.013 in Manning's formula, calculate the velocity discharge and Chey's coefficient when the sewer is running full. **(12 Marks)**

OR

4 a. With a neat sketch, explain crown corrosion of sewer. **(08 Marks)**

b. Find the minimum velocity and gradient required to transport coarse sand through a sewer of 60 cm diameter with sand particles of 1 mm diameter and specific gravity 2.66. Assume β(characteristics of solids) = 0.06 and f = 0.02 (Darcy friction factor). Assume the sewer to run half full. Take N = 0.012. **(12 Marks)**

Module-3

5 a. Explain screening unit of treatment process with neat sketch. **(08 Marks)**

b. A stream saturated with DO, has a flow of 1.2m^3/s, BOD of 4 mg/L and rate constant of 0.3 per day. It receives an effluent discharge of 0.25 m^3/s having BOD 20 mg/L, DO 5mg/L and rate constant 0.13 per day. The average velocity of flow of the stream is 0.18 m/s. Calculate the DO deficit at point 20 km and 40 km downstream. Assume that the temp is 20°C throughout and BOD is measured at 5 days. Take saturation DO at 20°C as 9.17 mg/L. **(12 Marks)**

OR

6 a. With a neat sketch explain Oxygen Sag Curve. **(08 Marks)**

b. A town discharges 80 cumecs of sewage into 9 stream having a rate of flow of 1200 m^3/s during lean days, at a 5 day BOD of sewage at a given temp is 250 mg/L. Find the amount of critical DO deficit and its location in the downstream portion of the stream. Assume deoxygeneration co-efficient K as 0.1 and co-efficient of self purification (f_s) as 3.5. Assume saturation DO at given temperature as 9.2 mg/L. **(12 Marks)**

Module-4

7 a. With a neat sketch explain activated sludge process. **(10 Marks)**

b. Define the following terms :

a) HRT b) Volumetric BOD loading

c) F/m ratio d) SRT (Solids retention time) **(10 Marks)**

OR

8 a. With a neat sketch explain working principle of Trickling filter. **(10 Marks)**

b. With a neat sketch explain working principle of waste stabilization pond. **(10 Marks)**

Module-5

9 a. Explain Nitrification and Denitrification process. **(10 Marks)**

b. Explain (i) Advanced Oxidation Process (ii) Electro-coagulation. **(10 Marks)**

OR

10 a. Explain (i) Soak pit (ii) Septic tank **(10 Marks)**

b. Explain (i) Eco-toilet (ii) Two pit latrines. **(10 Marks)**

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