CE 412 A: Water Supply & Wastewater Disposal Systems

Tutorial 1 – 2019-20 II

TUTORIAL 4

Problem 1: A rectangular sedimentation basin is designed to completely remove 20 μm particles. Volume of water to be treated is 25MLD. Take L:B = 5 and provide minimum length of 20m. Ensure minimum retention period of 3 hours is provided. Design the effluent launder for a loading rate of 12 m^3/m per hour.

Determine the overall removal obtained for a suspension with size distribution given below. Specific gravity of the particles is 2.65 and water temperature is 30 degree Celsius, at which the kinematic viscosity is viscosity is $8 \times 10^{-7} m^2/sec$

Particle size, mm	0.3	0.2	0.15	0.1
Weight fraction less than size (percent)	95	80	55	25

Problem 2: Table below gives the analysis of the frequency of storms of stated intensities and durations during 26 years for which rainfall data were available for a given town.

Duration in minutes	Number of storms of stated intensity or more for a period of 26 years.									
	30	35	40	45	50	60	75	100	125	Mm per hr
5	-	-	-	-	100	40	18	10	2	
10	-	-	90	72	41	25	10	5	1	
15	-	82	75	45	20	12	5	1	-	
20	83	62	51	31	10	9	4	2	-	
30	73	40	22	10	8	4	2	-	-	
40	34	16	8	4	2	1	-	-	-	
50	14	8	4	3	1	-	-	-	-	
60	8	4	2	1	-	-	-	-	-	
90	4	2	-	-	-	-	-	-	-	

Prepare a table to draw the intensity-rainfall-duration curves. It is required to design a storm sewer which drains a part of the town having an area of 5 hectares. A survey of that part of the area indicated that 50% of the area is densely populated (I=65-75%), 30% is occupied by industrial and commercial installations (I=70-90%), and the remaining 20% consists of open area, greenery etc. (I=10-20%). Further based on economic considerations and calculated risks, it is decided to design the storm sewer for 1 year frequency. The sewer has a length of 120m and is to be designed for 1mps velocity when flowing half full. Assume an inlet time of 12 minutes. The ground conditions dictate that the slope should not be more than 6.05m per 1000 meter.

Compute the diameter of the sewer and the difference in invert levels between the two manholes. Use following data for choosing runoff coefficient values.

Runoff coeff. For I=60-65%	0.365	0.427	0.477	0.531	0.569
Duration, minutes	10	20	30	45	60