BRANCH :	**Civil Engineering**	**DISPLAY DATE :**	
BATCH :	**6TH Bx, By, Bz, Bd**	**SUBMISSION DATE :**	

TUTORIAL-1 Design of Intake Structure

1.	For water supply of a town, water is to be pumped from a river 2.1 km away from reservoir. The R.L. of bottom of water level in river is 100 m while the R.L. of the reservoir is 120 m. The Per capita demand of the town is 170 liters per day with population of town 90,000. If the pumps are to operate for a total of 12 hours and the efficiency of pump is 75%, determine the size of the rising main and H.P. of the pumps. The value of the friction factor is 0.03 and the velocity of flow is 1.8 m/s. Assume maximum daily flow as 1.5 times average demand .
2.	A city with 3.5 lakh population is to be supplied water at 140 lpcd from a river 2 km away. The difference in water level of sump and reservoir is 20 m. If the demand has to be supplied in10 hours, determine the size of the main and B.H.P of the pumps required. Assume maximum demand as 1.5 times the average demand. Take f = 0.0075, velocity in the pipe as 2.0 m/s and efficiency of pump as 75%
3.	Design bell mouth canal intake for a city of 70,000 persons drawing water from a canal, which runs only for 10 hours a day with a depth of 1.6m. Also, calculate the head loss in the intake conduit if the treatment plant is 0.5 km away. Assume average consumption per persons =160 l/d. Assume the velocity through the screen and bell mouth to be 1.5 m/sec. and 0.30 m/s respectively.

TUTORIAL-2 Design of Water treatment units

1.	Design a rapid sand filter unit for treating $7x10^6$ liters/day supply for a town. The filter are to work day and night .take rate for filtration as 5500lit/m2/hour
2.	Give design criteria for flash mixer. Also design a flash mixer for a design flow of 285 m3/hr. Assume required data
3.	Design primary settling tank of rectangular shape for a city having population of 45000 with water supply of 150 liter/capita/day.

TUTORIAL-3 Design of Wastewater treatment units

1.	Enlist different types of settling and sedimentation tanks. Find the dimensions

	of a continuous horizontal flow rectangular sedimentation tank for the following data: (i) Volume of water to be treated = 5 million liters per day (ii) Detention period = 4 hours (iii) Velocity of flow = 15 cm/min.
2.	Discuss the low cost sanitation system and design a septic tank for 170 users. Take loading of 150 liters/capita/day for septic tank. Assume suitable data if required.
3.	Design a septic tank for a hostel housing of 125 persons provided with an assured flow at a rate of 120 liters per capita per day. Take sludge withdrawal period as 1 Year. Assume suitable data you may need.
4.	An average operating data for conventional activated sludge treatment plant is as follows: (1) Waste water flow = 30,000m3/d (2) Volume of aeration tank = 10,000 m3 (3) Influent BOD = 250 mg/l (4) Effluent BOD = 20 mg/l (5) MLSS = 2500 mg/l (6) Effluent SS = 30 mg/l (7) Waste sludge SS = 9000 mg/l (8) Quantity of waste sludge = 200 m3/d Based on above data determine (1) Aeration period (2) F/M ratio (3) BOD removal efficiency in percentage (4) Sludge age, day
5.	Determine the size of a high rate trickling filter for the following data : (i) Sewage flow is 10 MLD (ii) Recirculation ratio is 1.5 (iii)BOD of raw sewage is 230 mg/l (iv)BOD removal in primary clarifier is 30 % and (v) Final effluent BOD desired is 25 mg/l

TUTORIAL-4 Hydraulic Design of Sewer

1.	Calculate the velocity of flow and corresponding discharge in a circular sewer having a diameter of 1.00 m laid at a gradient 1 in 400. The sewer is running at 0.60 m depth. Take N = 0.012 in Manning's formula.
2.	Design a circular sewer to cater a residential colony in town for the following data (i) Area of colony = 36 hectares

	(ii)Population = 10,000 (iii)Per capita consumption = 180 lphd (iv)Critical design rainfall intensity = 4 cm/hr (v) General available slope of ground = 1in 1000 (vi)Manning's coefficient =0.015 (vii)Runoff Coefficient = 0.6

TUTORIAL-5 Design of distribution system

1.	Find out the storage capacity of equalizing storage for distribution reservoir for the data given in following table using analytical solution. Assume a 24 hour pumping at a uniform rate.

Time	Hourly demand (litres)	Time	Hourly demand (litres)
12 mid night	0	1 p.m.	96000
1 a.m.	47000	2	90000
2	54000	3	90000
3	63000	4	93000
4	65000	5	96000
5	72000	6	99000
6	90000	7	102000
7	102000	8	102000
8	122000	9	90000
9	130000	10	72000
10	129000	11	80000
11	120000	12	54000
12 noon	108000		