Student Exam No: _____

GANPAT UNIVERSITY

B. Tech. Semester – VI (CIVIL)

Regular Examination – April - June : 2015

2CI– 605: Environmental Engineering - II

Time: 3 Hours **Total Marks: 70**

Instructions: - (1) Answer to the two sections must be written in **separate** answer books.

(2) Figures to the right indicate **full** marks.

(3) Assume suitable data if required.

Section - I

1 (A) Assuming suitable criteria, design a complete mix activated sludge process unit and SST to treat 20 MLD of domestic wastewater. BOD_5 of settled wastewater to the reactor is 200mg/L and desired BOD_5 of treated effluent is 30mg/L. (12)

MLVSS in the reactor, X = 3500mg/L

Concentration of recycled sludge, Xr = 10000mg/L

MLVSS is 80% of MLSS

MCRT = 10 days

Effluent contains 25 mg/L of biological solids of which 65% is biodegradable.

BOD_5 is 68% of ultimate BOD and BOD rate constant = 0.1/day

OR

1 (A) Design a Trickling Filter Unit with rotary system for treating 10MLD of wastewater having a 5 day BOD of 250 mg/L. Assume suitable design criteria wherever required. (Exclude under-drainage system) (12)

2 (A) Assuming suitable data, design a circular primary sedimentation tank to treat domestic wastewater flow of a town having 10,00,000 population. (11)

OR

2 (A) Assuming suitable design criteria, design a grit chamber with a proportional weir for the wastewater having average flow of 7 MLD. (9)

(B) Define : (a)Specific Growth Rate (b)Yield Coefficient (2)

3 (A) The 7 days 20°C BOD of a sample of sewage is 300 ppm and its 3 days 37°C BOD is 500 ppm. Find out the value of de-oxygenation constant K_D, and then estimate its 5 day 30°C BOD. (4)

(B) Explain with neat figure sludge dewatering by the use of sludge drying beds. (4)

(C) The following test results were obtained for a waste water sample taken at an industrial facility. All of the tests were performed using a sample size of 100ml. Determine the concentration of TVS, TSS, VSS, and FSS.

- Tare mass of evaporating dish = 54.6422 g
- Mass of evaporating dish plus residue after evaporation at 105°C = 54.7022 g
- Mass of evaporating dish plus residue after ignition at 550°C = 54.6722 g
- Tare mass of Whatman GF/C filter = 1.5348 g
- Mass of Whatman GF/C filter plus residue after drying at 105°C = 1.5553 g
- Mass of Whatman GF/C filter plus residue after ignition at 550°C = 1.5453 g

Section – II

4 (A) Explain effects of different air pollutants on human, plants, and animals. (6)

(B) Enlist different methods of disposal of solid waste. Explain **any one** in detail. (6)

OR

4 (A) Explain collection & Transportation system for solid waste management system in detail. (6)

(B) Explain the stability of ambient air with respect to lapse rate. (6)

5 (A) Describe the zones of pollution in river streams. (5)

(B) Discuss the factors affecting self-purification of river streams. (6)

OR

5 (A) Describe oxygen deficit, de-oxygenation and re-oxygenation curve. (5)

(B) A city discharged 1500 liters per second of sewage into a stream whose minimum rate of flow is 6000 liters per second. The temperature of sewage as well as water is 20° C. the 5 day BOD at 20° C for sewage is 200 mg/l and that of river water is 1 mg/l. The DO content of sewage is zero, and that of stream is 90% of the saturation DO. If the minimum DO to be maintained in the stream is 4.5 mg/l. find out the degree of treatment required. Assume the de-oxygenation coefficient as 0.1 and re-oxygenation coefficient as 0.3. [saturation DO at 20° C is 9.17mg/l] (6)

6 (A) Define : (6)

Night soil , Garbage, Sewerage, Sullage, Rubbish , Sewer

(B) A circular sewer 50 cm in diameter is laid at a gradient 1 in 200. Using N=0.0125 in Manning's formula, calculate velocity, discharge and chezy's coefficient when the sewer is running full. (6)

TABLE 4.8 HYDRAULIC ELEMENTS OF CIRCULAR SEWERS RUNNING PARTIALLY FULL

$\frac{d}{D}$	$\frac{a}{A}$	$\frac{p}{P}$	$\frac{r}{R}$	For $N/n = 1.0$		$\frac{N}{n}$	For variable N/n	
				v/V	q/Q		v/V	q/Q
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1.00	1.000	1.000	1.000	1.000	1.000	1.00	1.000	1.000
0.90	0.949	0.795	1.192	1.124	1.066	0.94	1.057	1.002
0.80	0.858	0.705	1.217	1.140	0.988	0.88	1.003	0.869
0.70	0.748	0.631	1.185	1.120	0.838	0.85	0.952	0.712
0.60	0.626	0.564	1.110	1.072	0.671	0.83	0.890	0.557
0.50	0.500	0.500	1.000	1.000	0.500	0.81	0.810	0.405
0.40	0.373	0.436	0.857	0.902	0.337	0.79	0.713	0.266
0.30	0.252	0.369	0.684	0.776	0.196	0.78	0.605	0.153
0.20	0.143	0.295	0.482	0.615	0.088	0.79	0.486	0.070
0.10	0.052	0.205	0.254	0.401	0.021	0.82	0.329	0.017
0.00	0.000	—	—	—	0.000	—	—	—

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