Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC SEM-IV Examination-Nov-2011

Subject code: X40601 **Date: 21/11/2011**

Subject Name: Environmental Engineering

Time: 2.30 pm -5.00 pm **Total marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	(a)	Explain the terms: (i) Detention time, (ii) Overflow rate and (iii) Hydraulic loading.	**07**
	(b)	Design a grit chamber having a rectangular cross-section for the following data: Maximum Flow = 20 MLD Diameter of the smallest grit particles to be removed = 0.2mm. Average temperature = 20^0 C. Sp. Gr. of grit particles = 2.67.	**07**
Q.2	(a)	State and explain various points for the location of waste water treatment plant.	**07**
	(b)	Explain the theory of sedimentation process and derive the equation for settling velocity for discrete particles when Reynolds' number is 1 to 1000 and particle size is varying from 0.1 to 1 mm diameter.	**07**
		OR	
	(b)	Find the settling velocity of a spherical silica particle of Sp. Gr. = 2.67 in water at 25^0 C, if the diameter of particle is 0.02mm. Take dynamic viscosity of water at 25^0 C = 0.9×10^{-2} cm^2/sec.	**07**
Q.3	(a)	State the properties of common coagulants.	**07**
	(b)	Why coagulants are added to raw water? Explain the reason why Alum salt is used universally as coagulant. Also write the chemical reactions of Alum salt with water.	**07**
		OR	
Q.3	(a)	What is population fore cast? State the different methods of it and explain any one in detail.	**07**
	(b)	The following is the population record of a city available from past census records. Determine the future population of this city in the year 2040. Use Geometrical Increase method. Year: 1970 1980 1990 2000 2010 Population : 31.2 42.3 65.4 82.9 100.5 (in thousands)	**07**
Q.4	(a)	State the different materials used for the construction of sewers.	**07**
	(b)	A sewer of 0.6m diameter, laid at a gradient of 1 in 400 runs full. Using Crimp and Bruge's formula, calculate the velocity of flow and the discharge.	**07**
		OR	
Q. 4	(a)	State the different steps involved in the layout and construction of sewer lines and explain in detail with sketch the setting out.	**07**
	(b)	Write a brief note on disposal of screenings.	**07**
Q.5	(a)	Explain the primary and secondary treatments of waste water.	**07**
	(b)	What is self cleansing velocity of waste water flow in the sewers? What is dry weather flow?	**07**
		OR	
Q.5		Write Short Notes: (Any Four)	**14**

(i) Recirculation ratio.
(ii) Low cost sanitation.
(iii) Storage capacity of elevated service reservoirs.
(iv) Sewer Appurtenances.
(v) Procedure for determining the capacity (H.P.) of a pump for pumping the waste water.

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