Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

P.D.D.C. Sem - IV Examination June- 2011

Subject code: X40601

Subject Name: ENVIRONMENTAL ENGINEERING

Date:02/06/2011 **Time: 10.30 am – 01.00 pm**

Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Write your answers briefly and to the point.**

Q.1	**(a)**	Draw a flow diagram of sewage treatment plant for medium sized city and label all the units.	**07**
	(b)	State the different points for the location of a water treatment plant for surface source water. Why intake works are provided in the water treatment plant? Discuss the design criteria for the same.	**07**
Q.2	**(a)**	What is population forecast? Why it is required in the design of water treatment plant? State the different methods of forecasting future population and describe any one.	**07**
	(b)	Write a note on variation in demand of water.	**07**
		OR	
	(b)	State the different unit processes used to treat the waste water generated through a city and explain in detail aerobic biological unit process.	**07**
Q.3	**(a)**	What is plain sedimentation treatment in water treatment plant? Why it is required? State the theory of plain sedimentation.	**07**
	(b)	Explain the following terms: (i) Surface Overflow Rate (SOR); (ii) Surface loading. In a continuous flow settling tank 2.5 m deep and 30 m long, what flow velocity of water would you recommend for effective removal of 0.02 mm silica particles at 25^0 C? Specific gravity of silica particle is to be considered as 2.65 and kinematic viscosity of water at 25^0 C is 0.90×10^{-2} cm^2/sec.	**07**
		OR	
Q.3	**(a)**	Explain briefly the sedimentation aided with coagulation in water treatment process. State the properties of common coagulants.	**07**
	(b)	What is optimum dose of coagulant and how would you find it in the laboratory?	**07**
Q.4	**(a)**	What is grit chamber? Why it is necessary to provide this in the treatment of sewage? Discuss the design criteria of a grit chamber giving its neat sketch.	**07**
	(b)	How the efficiency of a grit chamber can be expressed? Explain the design criteria of grit chamber by giving its neat and labeled diagram. A grit chamber is to be designed to handle a sewage flow from a city having population of 50,000 and per capita daily demand of water is 140 liters. Design the grit chamber.	**07**

Assume the following:

(i) Maximum daily demand = 2.5 times the minimum daily demand

(ii) Detention time = 1 minute

(iii) Depth of water = 1.2 m

(iv) Horizontal flow velocity = 20 cm/sec

(v) Free board = 0.3 m

OR

Q. 4 **(a)** What is low cost sanitation system? Describe with the help of a neat sketch the components of a septic tank. **07**

(b) State the different processes adopted in tertiary waste water treatment plant. **07**

Q.5 **(a)** Give the comparison between high rate and conventional trickling filters. **07**

(b) What are SVI and MLSS? What does indicate a higher value of SVI? How would you overcome this condition at activated sludge plant? **07**

The MLSS concentration in an aeration tank is 2200 mg/l and the sludge volume after 30 minutes of settling in a 1 lit. Imhoff cone is 220 ml. Calculate:

(i) SVI; (ii) Required return sludge and (iii) SS concentration in the recirculated sludge.

OR

Q.5 Write Short Notes**: (Any Four)** **14**

(i) Testing of sewers.

(ii) Theory of filtration.

(iii) Sludge digesters.

(iv) Storage capacity of elevated service reservoirs.

(v) Flash Mixer.

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