Seat No.: _____   *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY
BE- VIth SEMESTER–EXAMINATION – MAY- 2012

Subject code: 160604   **Date: 17/05/2012**

Subject Name: Water and wastewater engineering

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.**

Q.1	**(a)**	What is per capita demand? Discuss factors affecting per capita demand.	**07**
	(b)	Describe different types of intakes and design a intake well for a flow of $0.1 \text{ m}^3/\text{sec}$.	**07**
Q.2	**(a)**	What is the necessity of water supply scheme? Draw a complete flow diagram of water treatment plant.	**07**
	(b)	What is the economic diameter of pumping mains? Give step wise procedure for finding BHP of pumps.	**07**

OR

(b) Enumerate different population forecasting methods and calculate the population after two decades for following data by any two methods.

Year	Population	Year	Population
1980	25000	1990	28000
2000	34000	2010	42000

07

Q.3	**(a)**	What is rate of filtration? Design a rapid sand filter with under drainage network for getting flow of $0.1 \text{ m}^3/\text{sec}$. Take rate of filtration as 5000 liters/sqm/hr.	**07**
	(b)	What is clariflocculator? Design a clariflocculator for flow of $0.1 \text{ m}^3/\text{sec}$. Assume suitable data as per manual.	**07**

OR

Q.3	**(a)**	Derive the equation for settling velocity in sedimentation tank and prove that settling velocity does not depend upon depth of sedimentation tank.	**07**
	(b)	Write short notes on: (i) Methods of disinfection (vi) Distribution networks	**07**
Q.4	**(a)**	Why biological treatment is necessary? Differentiate suspended growth process and attached growth process.	**07**
	(b)	Draw a complete flow diagram of wastewater treatment plant and describe the function of its each unit.	**07**

OR

Q.4	**(a)**	Describe the working of Trickling filters with sketch and discuss the formation of slime layer in it.	**07**
	(b)	What is HRTF? Determine the size of HRTF for flow of 4.50 MLD. If recirculation ratio = 1.5, BOD of wastewater =250 mg/l and final effluent desired = 30 mg/l. Assume suitable data if required.	**07**
Q.5	**(a)**	Why sludge recirculation is done in activated sludge process? Discuss the mass balance with sketch for completely mixed reactor of wastewater treatment using ASP.	**07**
	(b)	Enumerate different sewer appurtenances and describe man hole with sketch.	**07**

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Q.5 **(a)** Write short notes on: **07**
 (i) COD test   (vi) Factors affecting sludge digestion

(b) Discuss the low cost sanitation system and design a septic tank with soak **07**
pit for 100 users. Take loading of 120 liters/capita/day for septic tank and
percolation rate of 1250 liters/cum/day for soak pit. Assume suitable data if
required

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