Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – SUMMER • 2013

Subject code: 711806N **Date: 17-06-2013**

Subject Name: Water and Wastewater Treatment Technologies

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)**	Tabulate different main characteristics of water and wastewater indicating their desirable and permissible limits.	**07**
	(b)	Describe requirements of water for domestic and industrial purposes and discuss the variations in flows of wastewater.	**07**
Q.2	**(a)**	Describe different types of settling phenomena and derive the equation for settling velocity in sedimentation tank.	**07**
	(b)	Differentiate BOD and COD and find out the BOD_5 at 20^oC if BOD_2 at 35^oC is 150 mg/l. Assume $K_{D(20)}$ =0.1.	**07**
		OR	
	(b)	Define (i) ThOD (ii) TOD (iii) MCRT (iv) Sludge age (v) Sludge bulking (vi) F/M ratio.	**07**
Q.3	**(a)**	Describe the dilution method of BOD determination in laboratory and state the limitations of BOD test.	**07**
	(b)	What is clariflocculator ? Discuss the design criteria of it and draw its sketch with indicating all its parts.	**07**
		OR	
Q.3	**(a)**	What are stability and instability forces in coagulation process? Discuss the importance of energy barrier in process.	**07**
	(b)	What are different types of coagulants used in water treatment? Give chemical reactions for at least on coagulant.	**07**
Q.4	**(a)**	Discuss the theory of filtration and describe the different methods of washing of different filters.	**07**
	(b)	Differentiate absorption and adsorption? Describe briefly Freundlich isotherm and Langmuir isotherm equations.	**07**
		OR	
Q.4	**(a)**	Write short notes on (i) Anoxic and Aerobic & anaerobic Processes (ii) Particle size distribution	**07**
Q.4	**(b)**	Discuss the process of working of UASB reactor and discuss its merits and demerits.	**07**
Q.5	**(a)**	Differentiate the attached and suspended growth process and draw the complete flow diagram of ASP process.	**07**
	(b)	Describe the zero, first and second order reactions and discuss the pseudo first order reaction with examples.	**07**
		OR	
Q.5	**(a)**	Write short notes on (i) Plug flow reactor (ii) Trickling filter	**07**
	(b)	Differentiate the working of SSF and RSF and discuss different filter troubles in operation of RSF.	**07**

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