Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER– VI (New) EXAMINATION – WINTER 2019

Subject Code: 2160604   **Date: 11/12/2019**
Subject Name: Water & Waste Water Engineering
Time: 02:30 PM TO 05:00 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 the necessity of water supply schemes? Enlist phases involved in water supply scheme.	**03**
	(b)	Write objectives of aeration and disinfection process in water treatment plant.	**04**
	(c)	Draw a layout plan for a typical waste water treatment plant and explain function of each unit.	**07**
Q.2	**(a)**	Define residual chlorine and re-chlorination.	**03**
	(b)	Explain dead end system of water distribution network with its merits and demerits.	**04**
	(c)	Design a rectangular sedimentation tank of a water treatment plant for a town having population of 100000. Overflow rate= 25m/day, depth of tank =3.2m.	**07**

OR

	(c)	What is sedimentation with coagulation process? Derive the equation for settling velocity in sedimentation tank.	**07**
Q.3	**(a)**	Discuss different systems of water supply.	**03**
	(b)	What do you mean by optimum dose of a coagulant? How optimum coagulant dose is determined?	**04**
	(c)	A city with 1.5 lakh population is to be supplied water at 100lpcd from a river 1km away. The difference in water level of sump and reservoir is 30m.If the demand has to be supplied in 8 hours, determine the size of the main and B.H.P of the pumps required. Assume maximum demand of 1.5 times the average demand. Take f' =0.075, velocity in the pipe as 2m/s and efficiency of pump as 75 %.	**07**

OR

Q.3	**(a)**	Define the following terms: Flocculation, Type I settling, Detention time.	**03**
	(b)	Explain methods of disinfection of water. Enlist chemical used as disinfectants.	**04**
	(c)	What is an intake structure? Sketch and explain in details about river intake.	**07**
Q.4	**(a)**	What is maximum and minimum velocity in sewer? Write its importance in sewer design.	**03**
	(b)	What are the different types of pipes used for water supply? Discuss any two in details.	**04**

(c) Design a sewer to serve a population of 50000 with a water supply of 135 lpcd. The slope available for the sewer to be laid is 1 in 625 and the sewer to should be designed to carry four times the dry weather flow when running full. What would be the velocity of flow in the sewer when running full? **07**

OR

Q.4 **(a)** Write components of water treatment plant. **03**
(b) Enlist sewer appurtenances and explain manhole in brief. **04**
(c) What are the sources of sludge from an ETP? Explain the characteristics of sludge. **07**

Q.5 **(a)** Define the following terms: Sullage, F/M ratio, Hydraulic retention time. **03**
(b) Differentiate between attached growth process and suspended growth process. **04**
(c) Determine the size of high rate trickling filter for flow of 4.50MLD. Recirculation ratio= 1.5, BOD of wastewater =250mg/l and final effluent desired =30 mg/l.Assume suitable data if required. **07**

OR

Q.5 **(a)** Define the following terms: Recirculation ratio, SVI, stabilization pond. **03**
(b) Differentiate between trickling filter and activated sludge process. **04**
(c) Design a conventional activated sludge plant to treat settled domestic sewage with diffused air aeration system with the following data: **07**
Population = 1,50,000
Average sewage flow = 150 lpcd
Settled sewage BOD_5 = 200mg/l
Effluent BOD_5 required = 10mg/l

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