Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER III (NEW) – • EXAMINATION – SUMMER 2016

Subject Code: 2731703 **Date:03/05/2016**

Subject Name: Treatment Process Design and Drawing

Time:10:30 am to 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)**	Draw a neat process flow diagram of water treatment plant and show unit operations and unit processes.	**07**
	(b)	Compare the surface water and ground water for their quality, quantity and collection aspects.	**07**
Q.2	**(a)**	Draw a neat sketch for river intake. Discuss the factors to be considered for selection of site for a river intake.	**07**
	(b)	What is source yield? Explain the factors affecting source yield.	**07**
		OR	
	(b)	Discuss the site selection criteria for water treatment plant.	**07**
Q.3	**(a)**	Design set of three rapid gravity filters for treating the water at a water works, which has to supply the water to a town of population 1,00,000. Per capita demand of the town is 270 litres/day. The rate of filtration of the rapid gravity filters may be taken as 4500 litres/hour/sq.m.	**07**
	(b)	Write a note on the advantages and disadvantages of various water distribution methods and layouts.	**07**
		OR	
Q.3	**(a)**	Write short note on rural water supply.	**07**
	(b)	Discuss various methods of disinfection for water supplies. And also, explain why chlorination is commonly preferred for disinfection of water.	**07**
Q.4	**(a)**	Discuss the flow measuring devices. And explain design criteria for the same.	**07**
	(b)	Explain various types of aerators used for the treatment wastewater.	**07**
		OR	
Q.4	**(a)**	Prepare a preliminary design for a rotating bio-disc type installation to serve 1000 persons. Assume 80 % BOD removal at an organic load of 20 g BOD/m^2 day and 3 m diameter discs, spaced 5 cm apart on centres. Assume 200 litres flow person/day and influent BOD = 54,000 g/day.	**07**
	(b)	Explain the design criteria for Membrane Bioreactor.	**07**
Q.5	**(a)**	Design a facultative type aerated lagoon to provide post-treatment to 10,000 m^3/d UASB effluent with the following characteristics: (i) BOD to be reduce from 70 mg/L to 40 mg/L (ii) immediate Oxygen Demand caused by 20 mg/L of Sulphides (iii) Occasional solids carryover of 200 mg/L for ½ hour.	**07**
	(b)	Draw a typical sketch for various units for treatment of wastewater. SBR is one of the units. Also draw a process flow diagram for the same.	**07**
		OR	
Q.5	**(a)**	Discuss various combined biological and physic-chemical methods used for treating wastewater.	**07**
	(b)	Explain the following terms briefly: F/M ratio, mean cell residence time, hydraulic retention time, cross flow velocity, transmembrane pressure, silt density index, MWCO	**07**

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