Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – SUMMER 2022

Subject Code:3171306 Date:01/06/2022

Subject Name:Wastewater 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.**
4. **Simple and non-programmable scientific calculators are allowed.**

Q.1	**(a)**	Compare between Municipal and Industrial waste water	**03**
	(b)	Explain the phenomena involved in secondary treatment through Activated Sludge process.	**04**
	(c)	Discuss various design considerations of Primary Settling Tank	**07**
Q.2	**(a)**	Write a function of Grit chamber and Equalization Tank.	**03**
	(b)	Enlist and explain various steps of Anaerobic Sludge Digestion Process	**04**
	(c)	Design a Primary Sedimentation tank to treat the domestic waste water flow of town having 5,00,000 Population Strength of Wastewater generated = Medium; Average rate of water supply =250 lpcd; waste water generation rate =80%; suspended solids in wastewater = 250 mg/lit, BOD_5=200 mg/lit; Detention Time =2,0 hrs. Surface Loading rate = [At Daily average flow=40 m^3/m^2-d (m/d)], [At Peak flow=100m^3/m^2-d (m/d)]	**07**
		OR	
	(c)	Describe about design criteria of Primary Settling Tank	**07**
Q.3	**(a)**	Differentiate between Attached Growth Process and Suspended Growth Process	**03**
	(b)	Discuss about operational issues of suspended growth process.	**04**
	(c)	Design a conventional activated sludge plant to treat settled domestic sewage with diffused air system for the following data: Population =1,20,000 ; Per capita Sewage Contribution= 160 lpcd ; Settled Sewage BOD_5 = 200 mg/lit , Effluent BOD_5 required =14 mg./lit, Assume F/M=0.2 ,MLSS=3000 mg/lit, SVI=100,	
		OR	
Q.3	**(a)**	Enlist various Aeration Methods and explain Diffused Aeration method in brief.	**03**
	(b)	Discuss the function of UASB with line sketch	**04**
	(c)	Discuss the design steps and design criteria of Septic Tank in detail with neat sketch.	**07**

Q.4	**(a)**	Enlist various operational issues of Rotating Biological Contactors (RBC)	**03**
	(b)	Discuss the design criteria for Trickling Filter.	**04**
	(c)	Write the functions of the following (1) Bio Tower (2) Aerators (3) Return Sludge	**07**

OR

Q.4	**(a)**	Draw a neat sketch of Rotating Biological Contactors (RBC)	**03**
	(b)	Briefly discuss the function of the following: (1)Skimming Tank (2) Contact Beds	**04**
	(c)	Discuss the Design consideration of Sequencing Batch Reactor and write its design steps.	**07**
Q.5	**(a)**	Discuss the working of sludge digestor and Sludge thickener	**03**
	(b)	Enlist and explain various types of waste stabilization ponds	**04**
	(c)	Enlist and explain the design criteria for Sludge Digestor	**07**

OR

Q.5	**(a)**	Briefly discuss the following terms: 1. Rate of reaction 2. Heterogenous reaction 3. SRT	**03**
	(b)	Write the design criteria for Waste Stabilization Pond.	**04**
	(c)	Determine the capacity of Anaerobic Sludge Digestor to treat the sludge generated from a 10 MLD domestic waste water treatment plant. Date is as per the following Loading Rate = 3.0 kg of VS/d-m^3; Suspended Solids in Wastewater =250 mg/L,SS removal efficiency of primary clarifier =60% ;Volatile contents of Solids = 70%	**07**

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