

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VII(NEW) EXAMINATION – SUMMER 2019****Subject Code: 2171306****Date: 27/05/2019****Subject Name: Wastewater Engineering****Time: 02:30 PM TO 05:30 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

MARKS

- Q.1**
- | | | |
|-----|--|-----------|
| (a) | Discuss in brief the classification of screen | 03 |
| (b) | Write a short note: design of grease removal | 04 |
| (c) | Discuss the operational problems of UASB reactor | 07 |

- Q.2**
- | | | |
|-----|---|-----------|
| (a) | Enlist various approaches for the design of anaerobic digestors | 03 |
| (b) | Discuss the design criteria for aerated grit chamber | 04 |
| (c) | Discuss with the neat sketch offline and inline equalization | 07 |

OR

- (c) Determine the volume of equalization basin from the following data of time period vs. average flow during the time period where M = midnight

Time period	M-4	4-8	8-12	12-16	16-20	20-M
Avg. flow, cu.m/s	0.15	0.4	0.6	0.3	0.2	0.25

- Q.3**
- | | | |
|-----|---|-----------|
| (a) | Discuss the operational problems of suspended growth process. | 03 |
| (b) | Write a short note: high rate clarifier | 04 |
| (c) | Write down the procedure for the design of UASB reactor | 07 |

OR

- Q.3**
- | | | |
|-----|---|-----------|
| (a) | Explain the operational problems of chemical unit processes | 03 |
| (b) | Draw only a neat flow diagram of sludge drying beds | 04 |
| (c) | Discuss the design of extended aeration | 07 |

- Q.4**
- | | | |
|-----|--|-----------|
| (a) | Write down the equations used for the calculation of organic loading rate and sludge loading rate. | 03 |
| (b) | Discuss the design criteria of rotating biological contactor (RBC). | 04 |
| (c) | Design a suitable grit chamber to cater the need of a town having 0.2 million population with approximately 150 Litre per capita per day of sewage contribution. | 07 |

OR

- Q.4**
- | | | |
|-----|---|-----------|
| (a) | What can be done to prevent sludge bulking? | 03 |
| (b) | Enlist the various sludge handling equipments used and discuss any one in brief | 04 |

- (c) Design a rotating biological contactor system for the flow of 5 MLD having BOD₅ of 120 mg/L. The treated effluent should meet the discharge criteria of less than 30 mg/L of BOD₅. Assume maximum permissible organic loading rate as 0.05 kg BOD₅/m².d

- Q.5**
- | | | |
|-----|--|-----------|
| (a) | Enlist various means thro' which aeration can be provided to the effluent. | 03 |
| (b) | Draw only a neat sketch of Biotower | 04 |
| (c) | Design a bar screen for a peak flow of 50 MLD. | 07 |

- Q.5**
- (a) Write down the major equations used for the design of Biotower **03**
 - (b) Discuss the step by step design of SBR **04**
 - (c) Design a conventional activated sludge system having diffused aeration for the domestic wastewater having flow of 6300 m³/d, and having influent BOD₅ as 220 mg/L. Assume the removal efficiency of 30% in primary treatment. **07**

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