

GUJARAT TECHNOLOGICAL UNIVERSITY**M.E Sem-I Examination January 2010****Subject code:711806****Subject Name: Water and Wastewater Treatment Technologies****Date: 27 / 01 / 2010****Time: 12.00 – 2.30 pm****Total Marks: 60****Instructions:**

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

- Q.1** (a) Enlist and Explain the different mechanisms of filtration. **06**
(b) Define and Explain the following terms: **06**
(i) Discrete settling (ii) Flocculent settling (iii) Zone settling
- Q.2** (a) Define the terms: BOD, COD and TOC. Explain environmental significance and limitations of COD as a parameter. **06**
(b) (i) Define effective size and uniformity co-efficient of sand to be used in a sand filter. What are the values for SSF and RSF? **06**
(ii) Explain the mechanism of cleaning of SSF and RSF.
- OR**
- (b) (i) Enlist the method of back washing of RSF and Explain any one in detail. **06**
(ii) Explain Upflow and Biflow type sand filters.
- Q.3** (a) With the help of sketch explain the principal of biological treatment. **06**
(b) Define the following terms: **06**
(i) Mean Cell Residence Time (MCRT) (ii) Specific Growth Rate
(iii) Yield (iv) Maximum Specific Substrate Utilization Rate
(v) Decay Coefficient (vi) F/M Ratio
- OR**
- (a) For a CFSTR with recycle, derive the equation for finding volume of aeration tank. **06**
(b) Explain the steps involved in Anoxic Treatment process along with its schematic diagram. **06**
- Q.4** (a) Explain the various phases of BOD progression curve along with its schematic diagram. **06**
(b) List down the optimum environmental conditions for anaerobic treatment process and explain any two parameters thereof. **06**
- OR**
- Q.4** (a) Define terms : Aerobic, Anaerobic and Anoxic. List down the various anaerobic treatment methods / technologies for wastewater treatment. **06**
(b) Give comparison between physico-chemical analysis and biological analysis for organic matter measurement in wastewater. **06**
- Q.5** (a) Write a brief note about Stuck reactors. **06**
(b) Domestic sewage sample has BOD₅ at 20°C, 30 mg/L. if k is 0.15 day⁻¹, determine BOD at 1 and 5 days at 18°C. **06**
- OR**
- Q.5** (a) Derive the equation for Newton's law for settling velocity of Discrete particle. **06**
(b) Give definition and unit of expression of following parameters; **06**
(i) Scour velocity (ii) Surface overflow rate (iii) Weir over flow rate
