Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**ME – SEMESTER II (OLD) – • EXAMINATION – SUMMER 2016**

**Subject Code: 1721802** **Date: 18/05/2016**

**Subject Name: Treatment Process Design and Drawings**

**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.**

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|---|---|---|---|
| **Q.1** | **(a)** | A grit chamber has a wastewater depth of 0.8 m. Calculate the time required by a 0.2 mm sand particle to settle at the bottom. Also determine the length of the grit chamber if the flow through velocity is 0.3 m/sec. | **07** |
| | **(b)** | The diameter of clarifier is 18 m and wastewater flow rate 10 MLD. Calculate the detention time and Surface loading rate of the clarifier having a wastewater depth of 2.5 m. | **07** |
| **Q.2** | **(a)** | Design a grit chamber having rectangular channel and proportional weir for peak flow of 8 MLD. Assume design velocity 0.23 m/sec. | **07** |
| | **(b)** | Design a tube settler of square cross section with following data:<br>(i) Design flow = 1 MLD<br>(ii) Cross Section of tube = 50 mm x 50 mm<br>(iii) Length of tube = 1 m<br>(iv) Angle of inclination = $60^0$ | **07** |
| | | **OR** | |
| | **(b)** | Write a short note on "Tube Settler". | **07** |
| **Q.3** | **(a)** | Design a clariflocculator for a design flow of 16 x $10^3$ $m^3$/day. Assume suitable data. | **14** |
| | | **OR** | |
| **Q.3** | **(a)** | Design a circular sedimentation tank for design flow of 21,000 $m^3$/day. Assume SOR is 35 $m^3/m^2$.day. Check for WOR & Horizontal velocity. | **14** |
| **Q.4** | **(a)** | Design a Rapid Sand Filter system for a flow 27 MLD. Assume Suitable data. | **14** |
| | | **OR** | |
| **Q.4** | **(a)** | An activate sludge plant is to be design for 10 MLD domestic wastewater flow to operate at 10 days MCRT and 6 hrs of HRT. Assume BOD as 175 mg/L in influent to the aeration tank, sludge wasting flow equal to 70 $m^3$/day and returned sludge concentration equal to 8000 mg/L, determine the concentration of MLVSS to maintain in the aeration tank to achieve effluent BOD of 30 mg/L. Also determine recirculation ration at which plant should be operated. Assume $K_d$ = 0.6 $day^{-1}$ and Y = 0.6 | **14** |

| | | | |
|---|---|---|---|
| **Q.5** | **(a)** | Define following terms:<br>(i)A/c ratio (ii) Liquid to gas ration (iii) Can Velocity (iv) Pressure Drop (v) Drift Velocity (vi) Filter Drag (vii) Saltation velocity | **07** |
| | **(b)** | Design a venturi scrubber for a flow of 5 $m^3$/sec | **07** |

**OR**

| | | | |
|---|---|---|---|
| **Q.5** | **(a)** | A conventional cyclone with a diameter of 2 m handles 4 $m^3$/sec of standard air carrying particles with density of 1600 kg/ $m^3$ for Ne = 7. Determine the cur size diameter if the gas viscosity is 1.84 x $10^{-5}$ kg.m/sec and the gas density is 1.185 kg/$m^3$. | **07** |
| | **(b)** | Determine the number of bags for a flow of 15 $m^3$/sec & also shows its arrangement in the bag house. | **07** |

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