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**Sixth Semester B.E. Degree Examination, Dec.2014/Jan.2015**  
**Waste Water Treatment Engineering**

Time: 3 hrs.

Max. Marks:100

- Note: 1. Answer any FIVE full questions, selecting at least TWO questions from each part.**  
**2. Substantiate your answer with neat sketches, wherever necessary.**  
**3. Assume missing data, if any.**

**PART - A**

1. a. With the help of a flow diagram, briefly explain the functions of physical unit operations, chemical and biological unit processes employed in wastewater treatment. (10 Marks)  
 b. With neat sketches, explain the working of i) Aerated grit chamber ii) Vortex type grit chamber. (10 Marks)
2. a. Describe the different types of screens based on size, location and purpose. Draw the plan of a fixed bar type screen and name the parts. (10 Marks)  
 b. Design a bar screen for a peak average flow of 40MLD with following data :  
 i) Inclination of bars = 45° with vertical.  
 ii) Bar size = 50mm × 9mm.  
 iii) Clear spacing = 36mm.  
 iv) Velocity through the screen = 0.8m/s @ peak flow. (10 Marks)
3. a. Explain the various loading criteria used for aeration tank of activated sludge process. (10 Marks)  
 b. Design a conventional activated sludge plant to treat settled domestic waste water with diffused air aeration system, for the following data :  
 i) Population : 1,20,000.  
 ii) Per capita W/W contribution : 160 lpcd.  
 iii) Settled W/W BOD<sub>5</sub> : 200 mg/l.  
 iv) Effluent BOD<sub>5</sub> desired : 15 mg/l. Assume F/M = 0.2, MLSS = 3000 mg/l. (10 Marks)
4. a. Differentiate between attached growth and suspended growth processes. List various treatment techniques falling under each category. (05 Marks)  
 b. What are "Stabilization ponds"? How are they classified? Discuss with examples. (05 Marks)  
 c. Determine the size of a high rate trickling filter with following data :  
 i) Wastewater flow : 5MLD. ii) Recirculation ratio : 1.5.  
 iii) BOD of raw wastewater : 230 mg/l. iv) BOD removal in primary clarifier : 30%.  
 v) Effluent BOD<sub>5</sub> desired : 25 mg/l. (10 Marks)

**PART - B**

5. a. What are the different types of sludge thickening? Explain any one method in detail. (10 Marks)  
 b. Design a digestion tank for sludge settled in primary clarifier, with following data :  
 i) Average flow = 200 MLD ii) Total suspended solids in raw sludge = 300 mg/l  
 iii) Moisture content of digested sludge = 85%. (10 Marks)

- 6 a. What is meant by digestion of sludge? Explain the factors affecting sludge digestion. (10 Marks)
- b. Design a sludge drying bed for digested sludge of ASP for a population of 2,00,000. Solids in digested mixed sludge is 60g/head/day and dry solids loading rate is  $100\text{kg/m}^2/\text{year}$ . Percentage of solids is 6 and specific gravity is 1.02. (10 Marks)
- 7 a. Draw a neat sketch of sludge drying bed and name the salient features. (05 Marks)
- b. Write a brief note on sludge volume index. (05 Marks)
- c. List and explain in detail, the various methods for disposal of sludge from wastewater treatment plant. (10 Marks)
- 8 a. Differentiate between aerobic and anaerobic digestion. Bring out the design criteria of anaerobic digester elements. (10 Marks)
- b. With a neat sketch, explain the working of an anaerobic sludge digester. (10 Marks)



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