B.E. Civil Engineering Eighth Semester

CE811 - Elective-IV : Design of Water and Waste Water Treatment

P. Pages : 2 **GUG/W/18/1994**

Time : Three Hours * 1 5 2 6 * Max. Marks : 80

Notes : 1. All questions carry equal marks.
2. Answer all questions.
3. Due credit will be given to neatness and adequate dimensions.
4. Assume suitable data wherever necessary.
5. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) Explain in detail two film theory. **8**

b) What are the objectives of water treatment process and draw flow diagram for unit operation with function of each unit. **8**

OR

2. a) Design and draw the neat sketch of a cascade aerator for a design flow of 32 MLD assume suitable data. **8**

b) State various point to be considered while selecting site for water treatment plant. **4**

c) Write a note on spray Aerator. **4**

3. a) Determine the quantity of alum required in order to treat 13 million litter of water per day at treatment plant where 12 PPM of alum dose is required. Also determine the amount of carbon dioxide gas which will be released per litter of water treated. **6**

b) Design a coagulation cum sedimentation tank with continuous flow for a population of 70,000 persons. With daily per capita water allowance 130 litters. Make suitable assumption where needed. **10**

OR

4. a) Explain in detail. **8**
1) Mixing devices.
2) Wet Feeding method.

b) Find the settling velocity of spherical silica particle of specific gravity 2.67 in water at 25ºC if the diameter of particle is 0.004 cm. **5**

c) State various types of co-agulant used. **3**

5. a) Describe with the help of neat sketch a slow sand filter. Explain its working. **8**

b) Design a Rapid sand filter for a town having a total filtered water requirement of 7 million liter of water per day. Assume suitable data. **8**

OR

6. a) State and explain various methods of Disinfection. **8**

b) Write a note on **8**

1) Orthotolidine test

2) Break point chlorination.

7. a) Design an aerated grit chamber for the treatment of municipal waste water the average flow rate is 0.5 m^3/s. and peaking factor is 2.75. **8**

b) Design a bar screen for peak average flow of 40 million litter per day. **8**

OR

8. a) Explain with neat sketch working of skimming tank. **8**

b) Design a suitable rectangular sedimentation tank for treating sewage from a city provided with assured public water supply system with maximum daily demand of 12 million litter per day. Assume suitable value of detention period and velocity of flow in tank. **8**

9. Write a note on **16**

1) Stabilization pond

2) Sludge drying bed

3) Anaerobic stabilisation unit.

4) Imhoff tank

OR

10. a) Design the size of high rate trickling filter for the following data **8**

1) Sewage flow 5 MLD

2) Recirculation ratio = 1.5

3) BOD of raw sewage 230 mg/L

4) BOD removal – 30%

5) Final effluent BOD desired - 25 mg/L.

b) Design conventional ASP to treat settled domestic sewage with diffused air aeration system for. **8**

1) Population - 1,20,000

2) Per capita sewage contribution - 160 LPCD.

3) Settled sewage BODs - 200 mg/L

4) Effluent BODs required - 15 mg/L

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