B.E. / B.TECH(Arrear) DEGREE END SEMESTER EXAMINATIONS, APRIL/MAY 2011
CIVIL ENGINEERING BRANCH

SIXTH SEMESTER – (REGULATIONS - 2004)

CE 384 – ENVIRONMENTAL ENGINEERING II

21

Time: 3 hours **Answer All Questions** **Max.Marks: 100**

Instructions

(i) Part A carries a maximum of 20 marks and Part B carries a maximum of 80 marks
(ii) All questions in Part A carry 2 marks each and all questions in Part B carry 16 marks each
(iii) Make suitable assumptions wherever necessary and state them clearly.

PART A (10X2 = 20 Marks)

1. Bring out the difference between free chlorine and combined chlorine.
2. What is the significance of velocity gradient in flash mixer?.
3. Distinguish between type-I settling and type-II settling.
4. What are the objectives of grit removal?
5. An aeration tank has an MLSS concentration of 3000 mg/L. After settling for 30 minutes in a 1-L graduated cylinder, the sludge volume is measured to be 250 mL. Compute the SVI of the sludge.
6. What is the difference between low rate and high rate trickling filter?
7. What do you remediate sewage sickness?
8. List out the factors influencing oxygen transfer in self purification of stream.
9. What is lime stabilization of sludge?
10. What is the significance of volatile acid in anaerobic digestion?

PART B (5X16 = 80 Marks)

11.i) Discuss the effect of overflow rate and hydraulic retention time on suspended solids removal in primary settling tank. (4)

ii) Design the dimensions of a septic tank for a hostel with strength of 125 students. The water supply provided is 90 Lpcd. State how you would dispose the septic tank effluent and design the effluent disposal system. Assume the percolation capacity of soil is 204 $L/m^2/d$. (12)

12.a) i) A rapid sand filter unit is of size 10 m x 8 m. After filtering 11,000 m^3/d in 23 hour period, the filter is back washed at the rate of 10 $L/m^2/s$ for 11 minutes. Compute the average filtration rate, quantity and percentage of treated water used for back washing and the rate of wash water flow in each trough. The unit has 4 troughs. Design the geometry of the troughs. (8)

ii) Explain the working principle of rapid sand filter with schematic diagram. (8)

(OR)

12. b)i) Describe various methods of removing excess iron and manganese from ground water. (6)

ii) A water treatment plant treats 600 m^3/h of water. Workout the following with respect to a flocculator: Dimension of the flocculation unit, Power input to paddle and area of paddles. Take viscosity 0.89 x 10^{-3} Ns/m^2, velocity gradient 60 s^{-1}, C_D = 1.8 and relative velocity of paddle is 0.7 m/s. Assume any other suitable data. (10)

13.a) Enumerate and describe the various operational parameters in a conventional activated sludge process and compare with extended aeration process.

(OR)

b)i) Explain the algal- bacterial symbiosis with respect to aerobic pond. (6)

ii) Design a high rate trickling filter for treating sewage of 22 ML/d with an influent BOD_5 of 340 mg/L. Assume a recirculation ratio of 1.6 and efficiency of the filter as 84%. Use NRC equation. (10)

14.a)i) A town discharges 50 m^3/s of sewage into a stream having a rate of flow 1000 m^3/s. The DO content of sewage is zero. Saturation DO in stream is 8.5 mg/L. Find the DO of mix. (4)

ii) What do you mean by "Self purification" of stream? Explain the various physico-chemical and biological processes involved in self purification of streams. (12)

(OR)

b) Explain the various methods of sewage application on land with the aid of suitable sketches. Also state advantages and disadvantages of sewage application on land.

15.a) With a neat sketch explain the principle and working of two-stage anaerobic sludge digester. State the factors influencing sludge digestion.

(OR)

b)i) Explain the various methods of thickening of sludge with neat sketch. (12)

ii) Briefly describe elutriation process of sludge treatment in detail. (4)

*****