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B.E. / B.Tech. DEGREE END SEMESTER EXAMINATIONS, NOV/DEC 2013
CIVIL ENGINEERING BRANCH

SIXTH SEMESTER

CE 384 ENVIRONMENTAL ENGINEERING –II /
CE 9354 WASTE WATER ENGINEERING

{REGULATIONS: 2004/2008}

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 carries 2 marks each and all question in Part B carries 16 marks each
- (iii) Make suitable assumptions wherever necessary and state them clearly.

PART A (10X2 = 20 Marks)

1. What are the impacts of oxygen demanding waste on surface water bodies?
2. How do you quantify storm runoff?
3. What is the significance of self cleansing velocity in sewer design?
4. Under what circumstances manholes are provided in sewerage system?.
5. Distinguish between unit operations and unit processes.
6. What are the objectives of grit removal?
7. What is the significance of solids retention time in extended aeration process?
8. What is the role of algae in aerobic pond?
9. What do you mean by sewage farming?
10. What is the role of acetogenic bacteria in anaerobic digestion?

PART B (5X16 = 80 Marks)

- 11.i) Enumerate and explain the physico-chemical characteristics of sewage. (10)
- ii) The BOD_5 at $27^\circ C$ of wastewater sample has been measured as 480 mg/L. What portion of ultimate BOD would remain unoxidised after 7th and 10th day at $20^\circ C$? Assume the reaction rate constant at $20^\circ C$ as $0.21 d^{-1}$ (6)

-:2:-

- 12.a) Explain various systems of sanitary plumbing. Write down the main characteristics of each system.

(OR)

- 12.b) Briefly explain the various factors to be considered in the design of sewerage system. Design a sanitary sewer to serve a population of 6000 with per capita water supply rate of 135 Lpcd. Assume $n = 0.013$.

- 13.a)i) Design a primary sedimentation tank for a proposed sewage treatment plant of 120 ML/d capacity. (10)

- ii) Briefly discuss the operations and maintenance issues pertaining to screen chamber and grit channel. (6)

(OR)

- b) Design a septic tank with neat sketch for a hostel having 250 students. Design sewage flow is 60 Lpcd. What would be the size of the dispersion trench, if the effluent from the septic tank is to be discharged in it? Draw a neat sketch of the septic tank with dispersion trench.

- 14.a) Draw the typical process flow diagram for conventional ASP based sewage treatment plant and explain various operational parameters.

(OR)

- b)i) Explain the mechanism of working of a trickling filter with a neat sketch. (8)

- ii) Design a high rate trickling filter for treating sewage of 25 ML/d with a raw sewage BOD_5 of 300 mg/L. Assume a recirculation ratio of 1.9 and efficiency of the filter as 86%. Use NRC equation. (8)

- 15.a) Explain the self purification process of rivers and the various stages of oxygen sag curve.

(OR)

- b) Discuss the need for sludge treatment and explain the various stages of sludge treatment.