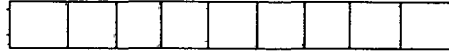


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**B.E. / B.TECH (Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV/DEC 2012
CIVIL ENGINEERING BRANCH**

SIXTH SEMESTER

**CE 9354 – WASTE WATER ENGINEERING
(REGULATIONS -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 is the significance of BOD/COD ratio?
- 2. What is the effect of oxygen demanding waste on water bodies?
- 3. Distinguish between self-cleansing and non-scouring velocity.
- 4. "Normally sewers run partially"-Justify this statement.
- 5. What do you mean by proportional flow weir?
- 6. What is the significance of over flow rate in sedimentation tank design?
- 7. How do you determine hydraulic loading rate of a trickling filter?
- 8. What is the significance of GLSS in UASB reactor?
- 9. Give the difference between deoxygenation and reaeration with respect to oxygen sag curve.
- 10. Enumerate various methods of sludge dewatering.

PART B (5X16 = 80 Marks)

- 11. i) Briefly describe the physico-chemical characteristics of wastewater. (8)
- ii) The BOD₅ at 27°C of wastewater sample has been measured as 248 mg/L. What portion of ultimate BOD would remain unoxidised after 7th and 10th day at 20°C? Assume the reaction rate constant at 20°C is 0.21 d⁻¹. (8)
- 12 a) i) State the principles you would observe while preparing drainage plan of a building. Give reasons for your answer. (12)
- ii) What are the requirements of a good trap? (4)

(OR)

- 12.b) i) What is the need for pumping of sewage? (4)
- ii) A combined circular sewer is to be laid to serve a catchment of 65 hectare.
Calculate the size of the combined sewer from the following data:
- | | | | |
|--------------------------------|---|----------|------|
| Population to be served | = | 40,000 | |
| Percapita water supply rate | = | 110 Lpcd | |
| Critical intensity of rainfall | = | 30 mm/h | |
| Coefficient of runoff | = | 0.40 | (12) |

- 13.a) i) Design a septic tank with dispersion pit for 200 users. The rate of water supply is 70 Lpcd. Assume suitable criteria as applicable. (10)
- ii) Assuming suitable criteria design a grit chamber for a proposed STP expected to treat 50 ML/d of sewage. (6)

(OR)

- b)i) Design a screening chamber unit for a design sewage flow of 50 ML/d. Assume suitable data wherever necessary. (8)
- ii) Draw a neat sketch of a settling tank and explain the salient features. (8)

- 14.a) Draw the typical process flow diagram for a conventional ASP based sewage treatment plant and write the objectives of each unit.

(OR)

- b)i) Explain the mechanism of working of aerobic stabilization pond with a neat sketch. (6)
- ii) Design a high rate trickling filter for treating sewage of 12 ML/d with an influent BOD₅ of 320 mg/L. Assume a recirculation ratio of 1.5 and efficiency of the filter 85%. Use NRC equation. (10)

- 15.a)i) A town discharges 80 m³/s of sewage into a stream having a rate of flow 1000 m³/s. The DO content of sewage is 0.5 mg/L. The DO concentration in the upstream side of the stream is 8.5 mg/L. Find the DO of mix. (4)

- ii) What do you mean by "Self purification" of stream? Explain the factors affecting self purification of streams. (12)

(OR)

- b)i) Explain the various stages involved in sludge treatment. (12)
- ii) Discuss the effect of pH and temperature on sludge digestion. (4)
