Roll No. | | | | | | | | | | |

B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY 2013

CIVIL ENGINEERING BRANCH

SIXTH SEMESTER

CE 9354 – WASTE WATER ENGINEERING
(Regulation 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 (10 x 2 = 20 Marks)

1. How do you assess biodegrability of wastewater?
2. What are the impacts of thermal pollutants in water bodies?
3. When does it become necessary to provide for the lift of sewage in a sewerage project?
4. Under what circumstances manholes are provided in sewerage system.
5. Enumerate the disposal techniques of screenings from STP.
6. What are the major factors influencing settling of discrete particles?
7. How will you estimate the BOD due to bio-solids in the treated effluent?
8. What is the significance of GLSS in UASB?
9. What is the role of methanogens in anaerobic digestion?
10. Distinguish between thickening and dewatering of sludge.

Part – B (5 x 16 = 80 marks)

11. i) Briefly explain the characteristics of sewage and state their discharge standards. (12)

ii) The BOD and TSS of a municipal sewage is found to be 340 and 290 mg/L respectively. Estimate the BOD and TSS load entering into a STP for 1500 kL/d sewage flow. (4)

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

(OR)

b) Briefly describe the various factors to be considered in the design of municipal sewer . Design a sanitary sewer to serve a population of 8000 with per capita water supply rate of 90 Lpcd. Assume n = 0.013. Assume suitable criteria as applicable

13.a) i) Explain the working principle of a septic tank with a neat diagram. (8)

ii) Design a primary settling tank unit for a proposed STP of 50 ML/d capacity . (8)

(OR)

b)i) Design a conventional grit chamber unit for a design sewage flow of 120ML/d. Assume suitable data wherever necessary. Draw a schematic diagram of the unit. (12)

ii) Discuss the significance of velocity control devices in grit chamber. (4)

14.a) Explain the mechanism of working of conventional ASP and extended aeration process for domestic sewage treatment. Also, compare the various operational parameters influencing the systems.

(OR)

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

ii) Design a single stage high rate trickling filter for the following data and draw a neat sketch.

Design Flow	50 ML/d
Recirculation ratio (R)	3.0
BOD of raw wastewater	280 mg/L
BOD removal in primary treatment	35%
Final effluent BOD desired	20 mg/L

(10)

15 a) Find the volume of biogas expected from sludge for the following data of raw and digested sludge and also design single stage anaerobic digester and sludge drying beds for the same. Evaluate the reduction in sludge volume after each stage.

Dry Solids in the feed to anaerobic digester	:	2000 kg/d
Percentage of solids	:	4 % in the raw sludge (4.5% after digestion)
Volatile matter	:	70% in the raw sludge (65% destruction during digestion)
Sp. Gravity of fixed solids	:	2.5
Sp. Gravity of volatile solids	:	1.04

(OR)

b) i) Briefly outline the various physico-chemical and biological processes involved in self purification of river. Develop a DO model for the same from basic principle. (12)

ii) The BOD_5 of an effluent from a poorly operating sewage treatment plant is 100 mg/L, and the discharge is 1.5 ML/d. The receiving stream has a BOD_5 of 3 mg/L. What minimum stream flow is needed for a dilution such that the combined BOD_5 of the sewage and stream water is not greater than 10 mg/L? (4)

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