B 216

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2005.

Sixth Semester

Civil Engineering

CE 339 — ENVIRONMENTAL ENGINEERING — II

(INCLUDING DRAWING)

Time : Three hours Maximum : 100 marks

Assume any data as necessary.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is Stoke's law? State its significance in classified design.

2. Define the term agitation and mention the factors influencing it.

3. Give the equation for finding out the head loss in a bar screen.

4. What is meant by surface loading rate? Give the range of surface loading rate for primary sedimentation tank.

5. What is meant by F/M ratio? In what way it is significant?

6. Why does 'Ponding' occur in trickling filters? In which season it is more common and why?

7. Define Eutrophication.

8. What are the advantages of land disposal of effluent?

9. What is gravity thickening?

10. What is meant by elutriation of sludge?

PART B — (5 × 16 = 80 marks)

11. (i) Design a single stage trickling filter for the following data :

Population	= 1,10,000
Percapita contribution of waste water	= 130 lpcd
Influent BOD to primary settling tank	= 300 mg/L
Efficiency of primary settling tank for BOD removal	= 30%

Effluent BOD standard	= 30 mg/L	
Depth of filter	= 2.1 m	
Hydraulic loading	= 22 m^3/m^2/day	(10)

(ii) Draw the cross section of the designed trickling filter showing all details. (6) 15.

12. (a) The population of a town is 50,000

Average demand of water = 135 litres/capita/day

Detention period = 2 hours

Depth of the tank = 3 m

Design a circular settling tank and draw the cross section. Check for the allowable overloading rate. (10 + 6)

Or

(b) Explain the methods of removal of iron and manganese from water. Why is their removal needed? (12 + 4)

13. (a) (i) Design a grit chamber for a maximum flow of 2 million litres per day of sewage. (10)

(ii) Prove that the surface loading is the important criteria of effective removal of particles in sedimentation tank and not the depth of the tank. (6)

Or

(b) Design a conventional activated sludge plant to treat domestic sewage with diffused aeration system for the following data :

Population	= 35,000
Average sewage flow	= 180 lpcd
BOD of sewage	= 220 mg/L
BOD removed in primary treatment	= 30%
Overall BOD reduction desired	= 85%

Assume any relevant data. (16)

14. (a) Design a septic tank for 90 users. The contribution of sewage is at the rate of 50 lpcd. Desludging period is 1 year. Assume any other data. Draw the cross section of the septic tank with the required effluent disposal system. (10 + 6)

Or

(b) (i) What do you mean by self purification in rivers? Describe the factors affecting self purification process. (3 + 5)

(ii) Sketch and explain the important features of oxygen-sag curve. (8)

15. (a) (i) Explain the deep well injection method of sewage disposal. (7)

(ii) Describe anaerobic sludge digestion process. What are the factors affecting this process? (3 + 6)

Or

(b) Write short notes on :

(i) Water softening (6)

(ii) Clariflocculator (5)

(iii) Sludge disposal. (5)
