

Reg. No. :

**Question Paper Code : 66147**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2011.

Sixth Semester

Civil Engineering

CE 2354 — ENVIRONMENTAL ENGINEERING – II

(Regulation 2008)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the typical characteristics of sewage from South Indian Cities?
2. Explain the meaning and significance of 'time of concentration'?
3. How is the capacity of the wet well in a sewage pumping station determined?
4. Distinguish between "Self Cleaning velocity" and Non scouring velocity.
5. What are the differences in the functions of 'Screen Chamber' and 'Grit Chamber' in sewage treatment?
6. What is meant by Grey water Harvesting?
7. What are the objectives of Secondary and Tertiary treatment of sewage?
8. What is the operational principle of waste stabilization ponds?
9. What are the concerns in the application of sewage on to land?
10. How does one improve the dewaterability of sludge?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Estimate the storm runoff from 10 hectares of a surface having the following characteristics if the maximum rain intensity in the area is 5 cm/h. (8)

Nature of surface	Roo f	Pavement s	Paved yards	Maccadam roads	Lawns and gardens	Thick vegetation
Areal distribution (% of total)	30	10	5	25	25	5
Coefficient of run off	0.9 0	0.85	0.80	0.40	0.1	0.05

- (ii) Explain the Legal requirements and standards regarding treatment of sewage. (8)

Or

- (b) (i) Determine the BOD load in kg/day in the sewage from a town supplied with 10 MLD of water assuming that 60% of the water supplied is returned as wastewater with a BOD of 280 mg/L. (8)
- (ii) List the information to be collected while planning for sewerage systems. How will you use the corrected information? (8)
12. (a) (i) Determine the diameter and slope of a sewer ( $n=0.013$ ) carrying  $0.0125 \text{ m}^3/\text{s}$  of peak sewage flow at half full depth. (8)
- (ii) Explain the one pipe and two pipe systems of sewerage. (8)

Or

- (b) (i) Discuss the Choice available and the factors to be considered while selecting pumps and pipes for a sewerage System. (8)
- (ii) With the help of neat sketches explain the location and functions of drop manhole "inverted siphon". (8)
13. (a) Design a circular primary sedimentation tank to treat an average sewage flow of  $5000 \text{ m}^3/\text{day}$ , suitably assuming the design criteria. Draw a neat sketch of the designed tank.

Or

- (b) Design a septic tank for on site sanitation of a housing colony with 120 population. Assume suitable design criteria and draw a neat sketch of the designed tank. (16)



14. (a) (i) Explain the components and the operational principles of Activated Sludge Process. (8)
- (ii) Design an oxidation ditch for a community of 7500 with a per capita sewage contribution of 90 Lpcd and BOD 250 mg/L. The desired BOD of the treated sewage is 30 mg/L. (8)

Or

- (b) (i) With the help of a neat sketch explain the function and operation of UASB. (8)
- (ii) Determine the surface area of a low rate trickling filter to treat 10 MLd of average sewage flow with a BOD of 300 mg/L at an organic loading rate of 0.2 kg BOD/m<sup>3</sup>/day. (8)
15. (a) (i) Draw a typical oxygen sag curve and explain its meaning. (8)
- (ii) Determine the BOD of river water at the discharge point of the treated sewage from a town having a BOD of 30 mg/L discharged at the rate of 5 m<sup>3</sup>/s into a river having a flow of 30 m<sup>3</sup>/s and no BOD? (8)

Or

- (b) (i) Explain the Streeter Phelps equation and its application. (8)
- (ii) Determine the volume reduction due to dewatering of sludge from a liquid content of 8% to 15%. (8)