

Reg. No. :

Question Paper Code : 20601

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2022.

Fifth/Sixth Semester

Environmental Engineering

EN 8592 — WASTEWATER ENGINEERING

(Common to Civil Engineering)

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define self-cleaning velocity.
2. Define population equivalent.
3. Compare unit operations and processes.
4. Mention the objective of primary treatment of sewage.
5. Mention any two advantages of SBR.
6. Mention the different types of trickling filters.
7. Mention any two disadvantages of sewage farming.
8. Mention the BOD and COD parameter effluent discharge standards in Inland surface water.
9. List the objective of sludge treatment.
10. Define sludge conditioning.

PART B — (5 × 13 = 65 marks)

11. (a) Discuss the major chemical characteristics of domestic sewage. (13)

Or

- (b) The population of 30000 is residing in a town having an area of 60 hectares. If the average coefficient of run off for this area is 0.60 and the time of concentration of design rain is 30 minutes, calculate the discharge for the sewer of proposed combined system. (13)

12. (a) Design a septic tank for a small colony of 150 persons with per capita water supply being 120 litres/capita/day. Assume any data required. (13)

Or

- (b) Design a primary sedimentation tank for a city which is receiving a daily water supply of 10 MLD. (13)

13. (a) Illustrate the working of activated sludge process. (13)

Or

- (b) Compare conventional and high rate trickling filters. (13)

14. (a) Discuss the different zones of pollution in a river stream. (13)

Or

- (b) Describe the methods, problems and limitations of land disposal of sewage. (13)

15. (a) Illustrate the working of sludge drying bed. (13)

Or

- (b) Discuss the stages in sludge digestion and factors affecting sludge digestion and control. (13)

PART C — (1 × 15 = 15 marks)

16. (a) The surface water from airport road is drained to the longitudinal side drain from across one half of a bituminous pavement surface of total width 7 m, shoulder and adjoining land of width 8 m on one side of the drain. On the other side of the drain, water flows across from reserve land with average turf and 2% cross slope towards the side drain, the width of the strip of this land being 25 m. The inlet may be assumed to be

10 minutes for these conditions. The runoff coefficients of the pavement, shoulder and reserve land with turf are 0.8, 0.25 and 0.35 respectively. The length of the stretch of land parallel to the road from where the water is expected to flow to the side drain is 400 m. Estimate the quantity of runoff flowing in the drain assuming 10 year frequency. The side drain will pass through clayey soil with allowable velocity of flow as 1.33 m/s. intensity duration chart for 10 year frequently is (15)

Duration (minutes)	5	10	15	20	30
Intensity (mm/hr)	160	150	125	110	95

Or

- (b) Design an aerated grit chamber for treating municipal solid wastewater with average flow rate of $0.5 \text{ m}^3/\text{s}$. Assume suitable data. (15)