



KUMARAGURU
college of technology
character is life

B.E/B.TECH DEGREE EXAMINATIONS: NOV/DEC 2024

(Regulation 2018)

Fifth Semester

CIVIL ENGINEERING

U18CEI5201: Environmental Engineering

COURSE OUTCOMES

- CO1:** Plan and estimate public water supply system.
- CO2:** Design the various components of water treatment plants.
- CO3:** Design water distribution networks and service supply to buildings.
- CO4:** Estimate and design of sewage flow and plumbing system.
- CO5:** Design of septic tanks and the various components of sewage treatment plants.

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

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|--|-----|-------------------|
| 1. What is meant by coincidental draft and perception demand? | CO1 | [K ₁] |
| 2. Mention any 2 advantages and disadvantages of steel pipe. | CO1 | [K ₁] |
| 3. Estimate the settling velocity of particles of diameter 0.07 mm, 1.3mm, and 0.28 mm having a specific gravity of 2.70 in a temperature of 22°C. Take kinematic viscosity as $1.009 \times 10^{-6} \text{ m}^2/\text{sec}$. | CO2 | [K ₃] |
| 4. Distinguish between unit operation and unit process. | CO2 | [K ₁] |
| 5. List out any 4 requirements of good distribution system. | CO3 | [K ₂] |
| 6. What is meant by balancing storage in a distribution reservoir? Suggest the appropriate method to estimate the balancing storage. | CO3 | [K ₂] |
| 7. Write the any 2 advantages and disadvantages of a partially combined sewerage system. | CO4 | [K ₂] |
| 8. Illustrate with neat sketch a Gully trap. | CO4 | [K ₁] |
| 9. Differentiate between activate sludge process and trickling filter of wastewater treatment. | CO5 | [K ₂] |
| 10. If a 5day BOD of sewage at 30°C is 110mg/L. What will be its 3 day BOD at 30°C? Assume BOD constant $K_d=0.1/\text{day}$ (at 30°C) | CO5 | [K ₃] |

Answer any FIVE Questions:-

PART B (5 x 16 = 80 Marks)

(Answer not more than 400 words)

- | | | | |
|--|----|-----|-------------------|
| 11. a) Predict the population for the year 2021, 2031, and 2041 from the following | 10 | CO1 | [K ₃] |
|--|----|-----|-------------------|

population data using Arithmetic mean and Geometric mean method.

Year	1961	1971	1981	1991	2001	2011
Population	8,58,545	10,15,672	12,01,553	16,91,538	20,77,820	25,85,862

- b) Explain the factors that affect the rate of water supply demand in a city. 6 CO1 [K₂]
12. a) Write Short notes on Nalgonda technique and Aeration process 8 CO2 [K₂]
b) With neat sketch explain the functions and operations of Rapid sand filter. 8 CO2 [K₂]
13. a) Discuss the various systems of water distribution from a service reservoir to a community mentioning their merits and demerits CO3 [K₂]
b) Explain with neat sketches the types of plumbing systems. CO3 [K₂]
14. a) A combined sewer of a circular section is to be laid to serve a particular area. 10 CO4 [K₃]
Calculate the size of this sewer from the following data:
Area to be served : 140 hectares
Population : 2,00,000
Maximum Permissible flow velocity : 3 m/sec
Time of entry of storm water : 12 minutes
Time of flow in channel : 20 minutes
Per capita water supply : 25 lpcd
Coefficient of run-off for the area : 0.45
Hourly, maximum rainfall for the area
At the design frequency : 5 cm
Assume any other data not given and if needed.
b) ii. Discuss any two sewer appurtenances with neat sketches. 6 CO4 [K₂]
15. a) Illustrate with neat sketch on a layout of wastewater treatment plant. 6 CO5 [K_L]
b) Determine the size of a high rate trickling filter for the following data. 10 CO5 [K_L]
i. Sewage flow = 5 MLD
ii. Recirculation ratio = 1.5
iii. BOD of raw sewage = 250 mg/L
iv. BOD removal in primary tank = 30%
v. Final effluent BOD desired = 30 mg/L
16. a) Discuss in detail the types of intake structure with neat diagram. 8 CO1 [K₂]
b) Differentiate Slow sand and Rapid sand gravity filters. 8 CO2 [K₂]
