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# B.M.S. College of Engineering, Bengaluru-560019

**Autonomous Institute Affiliated to VTU**

## June 2025 Semester End Main Examinations

**Programme: B.E.** **Semester: V**

**Branch: Civil Engineering** **Duration: 3 hrs.**

**Course Code: 23CV5PCENV / 22CV5PCENV** **Max Marks: 100**

**Course: Environmental Engineering II**

**Instructions**: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

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**Important Note:** Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

| | | | UNIT - I | *CO* | *PO* | Marks |
|---|---|---|---|---|---|---|
| 1 | a) | | Explicate the differences between conservancy and water-carriage systems of sanitation. | *CO1* | *PO1* | **10** |
| | b) | | Design a sewer to serve a population of 36,000 the rate of water supply being 135 Lpcd of which 80% finds its way into sewer. The sewer are laid at a slope of 1 in 625 and sewer should be designed to carry three times dry weather flow when running full. N=0.012. | *CO1* | *PO3* | **10** |
| | | | **OR** | | | |
| 2 | a) | | Elucidate briefly the different types of sewerage system. Mention advantages and disadvantages of each. | *CO1* | *PO1* | **10** |
| | b) | | Calculate the diameter and discharge of a circular sewer laid at a slope of 1 in 400 when it is running half full and with a velocity of 1.9 m/s. Use n = 0.012. | *CO1* | *PO3* | **10** |
| | | | **UNIT - II** | | | |
| 3 | a) | | Explain in detail the process of laying of sewer with neat sketches. | CO2 | PO1 | **10** |
| | b) | | Discuss the following with a neat sketch:<br>i. Catch basins<br>ii. Manhole. | *CO2* | *PO1* | **10** |
| | | | **OR** | | | |
| 4 | a) | | Identify the different shapes of sewers and assess their applications on the field with neat sketches. | *CO2* | *PO2* | **10** |
| | b) | | Analyse the function and applications of various types of sewer traps. | *CO2* | *PO2* | **10** |
| | | | **UNIT - III** | | | |
| 5 | a) | | Assess the physical, chemical and biological characteristics of sewage. | *CO3* | *PO2* | **10** |

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|---|---|---|---|---|---|---|
| | | b) | The 5 day 30°C BOD of a sewage sample is 110 mg/L. Calculate its 5 day 20°C BOD. Assume the deoxygenation constant at 20°C? $K_{20}$ as 0.1. | ***CO3*** | ***PO3*** | **10** |
| | | | **OR** | | | |
| | 6 | a) | Discuss self-purification phenomenon of streams? Analyse the different zones of self-purification with a neat sketch. | ***CO3*** | ***PO2*** | **10** |
| | | b) | A partially treated town sewage 1.5 MLD having a BOD of 100 mg/L is to be discharged into a stream. The stream water has a BOD of 10 mg/L. If the final BOD of the stream is not to exceed 30 mg/L, what should be the minimum flow of the stream? | ***CO3*** | ***PO3*** | **10** |
| | | | **UNIT - IV** | | | |
| | 7 | a) | Draw a flow diagram illustrating a municipal sewage treatment plant, including the sludge digestion process. Identify the removal of key pollutants at each treatment stage. | ***CO3*** | ***PO2*** | **10** |
| | | b) | Calculate the diameter, depth and weir loading of a primary sedimentation tank, using the following data:<br>Sewage flow - 6 MLD<br>Detention period - 2 hrs<br>Overflow rate - 1500 $L/m^2/h$ | ***CO3*** | ***PO3*** | **10** |
| | | | **OR** | | | |
| | 8 | a) | Explain with a neat sketch, the working of the following secondary treatment units<br>i. Activated sludge process<br>ii. Trickling filter | ***CO3*** | ***PO2*** | **10** |
| | | b) | The sewage is flowing at 4.5 MLD from a primary clarifier to a standard rate trickling filter. The 5-day BOD of the influent is 160 mg/L. The value of the adopted organic loading is to be 160 $gm/m^3/day$ and the surface loading is 2000 $L/m^2/d$. Determine the volume of the filter and its depth. Also calculate the efficiency of this filter unit. | ***CO3*** | ***PO3*** | **10** |
| | | | **UNIT - V** | | | |
| | 9 | a) | Analyze the working principle of a sequential batch reactor (SBR) with a neat sketch. | ***CO3*** | ***PO1*** | **10** |
| | | b) | Discuss the advantages and disadvantages of reuse and recycling of sewage. | ***CO3*** | ***PO2*** | **10** |
| | | | **OR** | | | |
| | 10 | a) | Elucidate the working principle of membrane bioreactor (MBR) with a neat sketch. | ***CO3*** | ***PO1*** | **10** |
| | | b) | Discuss various techniques for the removal of nitrogen and phosphorous from wastewater. | ***CO3*** | ***PO2*** | **10** |

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