



JOIN  
VIT QUESTION PAPERS  
ON TELEGRAM



**VIT**  
Vellore Institute of Technology  
(Deemed to be University under section 3 of UGC Act, 1956)

## Continuous Assessment Test – II

Programme Name & Branch: B.Tech – Civil Engineering

Course Name & Code: CLE1006–Environmental Engineering

Class Number: 5157

Slot: E2

Exam Duration: 90 Minutes

Maximum Marks: 50

General instruction(s): Answer All the Questions

### Section – A (4 x 5 = 20 Marks)

1. Determine the build-up of headloss through a bar screen when 50% of the flow area is blocked off due to the accumulation of coarse solids. Assume the following conditions apply:  
Approach velocity = 0.6 m/s  
Velocity through clean bar screen = 0.9 m/s  
Open area for flow through clean bar screen = 0.19 m<sup>2</sup>  
Headloss coefficient for a clean bar screen ( $C^2$ ) = 0.7.
2. A jar test has shown that the optimum dose of ferric chloride consumes all of the alkalinity. If the amount of ferric chloride that is in excess is 10 mg/L, how much lime ( $\text{Ca(OH)}_2$ ), in mg/L must be added to neutralise the acid formed?
3. A water treatment plant has two clarifiers treating 0.3 m<sup>3</sup>/s of water and having a particle retained capacity of 30%. The size of each clarifier is 6 m wide, 20 m long and 4 m deep. Determine the surface ( $V_s$ ) and over flow ( $V_o$ ) rate in the clarifier.
4. For a flow of 0.8 m<sup>3</sup>/s, how many rapid sand filter boxes of dimensions 10 m x 20 m are needed for a hydraulic loading rate of 110 m<sup>3</sup>/d.m<sup>2</sup>?

### Section – B (2 x 15 = 30 Marks)

5. A sedimentation facility was designed to treat an average flow of 0.6 m<sup>3</sup>/s. The design overflow rate and the side water depths are 45 m<sup>3</sup>/m<sup>2</sup>·d and 3.5 m, respectively. The length-to-width ratio of the rectangular basin is 4.3:1. Calculate the dimensions of each basin if two basins in parallel are provided. Also determine the detention time and surface overflow rate at design peak flow (take the peak factor value as 2).
6. Municipal wastewater is treated in a primary and BNR treatment facility followed by a post polishing filter for reuse. The log reductions of total coliforms (MPN) the primary, BNR, and post polishing filters are 0.3, 2.5, and 3, respectively. The total coliform count of raw wastewater is  $5.8 \times 10^7$ . Estimate the number of total coliforms (MPN) in the effluents from the primary, BNR, and post polishing filters.

1.17  
35 60  
35  
250  
280

26.8  
16 7 430  
326  
110