VIT

Vellore Institute of Technology

Winter Semester 2019-20

Continuous Assessment Test – II

Program Name & Branch: B Tech Civil Engineering

Course Name & Code: Environmental Engineering & CLE 1006

Class Number: 5843 **Slot: A1** **Exam Duration: 90 mins** **Maximum Marks: 50**

Faculty Name: Bhaskar Das **Exam Mode: Closed book**

General instruction(s): NA

Section – A (5 x 10 = 50 Marks)

1. (a) Explain the mechanism of destabilization of the colloidal particles for the (i Formation of deltaic plain and (ii) coagulation in water treatment. [5]

   (b) Determine the quantity of alum required in order to treat 13 million litres of water per day at a treatment plant, where 12 ppm of alum dose is required. Also determine the amount of CO_2 gas which will be released per litre of water treated. [5]

2. (a) What is the significance of 'filter to waste' operation in water treatment? Explain with proper valve operation. [5]

   (b) Design five slow sand filter beds from the following data for the water works of a town of population 50000. Per capita demand = 135 liters/day/capita; Rate of filtration = 214 liter/hr/m^2. Assume maximum demand as 1.5 times the average demand. Out of five units, one is to be kept as stand by and used while repairing other units. [5]

3. Below is the percentage of different particle present in the water along with their diameter. What will be the total percentage of removal if the surface overflow rate is 43.2 m^3 /(m^2.day). The value of μ and ρ_w may be taken as 0.00157 N s/m^2 and 1000 kg/m^3 respectively.

Sl. No.	Percentage (%)	Diameter
1	25	0.015 mm
2	37	0.03 mm
3	21	0.045 mm

4. What is the chlorine concentration required for a contact time of 21 min to achieve a 3 Log removal of E-coli? The preliminary experiment shows that a concentration of 0.7 mg/L of free available chlorine yield a 99.4% kill of bacteria in 8 minutes. Assume that Chick's Law and Watson's Law hold with n=1.

5. Explain the removal principle of H_2S gas and Fe simultaneously from contaminated wastewater in (a) diffused aerator and (b) Spray nozzle aerator.