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The Assam Royal Global University, Guwahati
Royal School of Engineering and Technology
B. Tech (Civil Engineering), 7th semester
Special Supplementary Examination, August 2024
Course Title: Water Quality Engineering
Course Code: CEE022D702

Time: 3 Hours

Maximum Marks: 70

Note: Attempt all questions as per instructions given.
The figures in the right-hand margin indicate marks.

Section – A

1. Attempt **all** questions. (Maximum word limit 50) 2 x 8
- a. What are the various coagulants used in the water treatment process?
 - b. What is zeta potential?
 - c. What are the various chemical parameters used to determine the water quality?
 - d. Mention some diseases and their responsible water quality parameters.
 - e. Why is it important to study reactor theory?
 - f. What is the material balance equation?
 - g. What is gravity separation?
 - h. Write about the factors affecting the settling rate of suspended particles.

Section – B

2. Attempt **any two** of the following: 6 x 2
- a. What is filtration? Write about the basic filtration mechanisms.
 - b. Derive the particle settling theory equation.
 - c. A sand particle has an average diameter of 1 mm and a shape factor of 0.90 and a specific gravity of 2.1. Determine the terminal velocity of the particle settling in water at 20° C. The kinetic velocity and specific gravity of water are $1.003 \times 10^{-6} \text{ m}^2/\text{s}$ and 1 respectively.
3. Attempt **any two** of the following: 7 x 2
- a. How much alkalinity will be destroyed if 110 mg/l of bulk ferric sulphates is applied to the water at a water treatment plant? Assume that the bulk ferric sulphates are 20% by weight of Iron (Fe).
 - b. Write about the possible behaviors for the Carbonate buffer system.
 - c. Write about the different aspects of a colloidal particle.
4. Attempt **any two** of the following: 7 x 2
- a. What are the strategies used to enhance the gas transfer process in a treatment plant?
 - b. What are the techniques used in particle characterization?
 - c. Write about various reactors used in a treatment plant.
5. Attempt **any two** of the following: 7 x 2
- a. Explain the various forms of energy involved in a treatment plant.
 - b. Write a short note on membrane separation.
 - c. Write about the advantages of various disinfection methods.