

系所組別：環境工程學系甲組

考試科目：衛生工程

考試日期：0225，節次：1

1. (1) Name and discuss the four mechanisms thought to occur for destabilization of colloids during coagulation.
(2) When treating low-turbidity source water, clay may be added as coagulants aid. Explain the rationale behind this practice, based on the mechanisms of coagulation. (20%)
2. Discuss the differences among (1) granular media filtration, (2) precoat filtration, and (3) membrane filtration. (20%)
3. When design a pumping system, the engineer needs the following information, explain what they are and their role in pumping operation
 - (1) System head curves
 - (2) Pump characteristic curves
 - (3) The available net positive suction head (20%)
4. A completely mixed activated sludge plant has a capacity of $10,000 \text{ m}^3/\text{d}$. The wastewater after primary treatment has a BOD_5 of 150 mg/L , while that for the effluent from final clarifiers is 10 mg/L . Assume the concentration of suspended solids of the effluent can be neglected. The biological reactor is to operate at a MLSS concentration of $3,000 \text{ mg/L}$, and the final clarifiers are design to thicken the sludge to $10,000 \text{ mg/L}$. The hydraulic retention time of the aeration tank is 6 hrs, and the recycle ratio (Q_r/Q) is 0.4. Calculate (1) F/M ratio, (2) the mean cell residence time. (20%)
5. (1) What is the purpose of sludge digestion?
(2) Describe the anaerobic digestion process.
(3) Try to differentiate between the standard-rate and high-rate anaerobic digesters. (20%)