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SARDAR PATEL UNIVERSITY
M. Sc. -Integrated Biotechnology – Tenth Semester Examination
Saturday, 23rd March 2019
Time: 10:00 am to 01:00 pm
PS10CIGEB3: Environmental Engineering

Total Marks – 70

- Q.1 Mark the right answer of following questions. [08]**
1. During uptake of _____ compound, orthophosphate release during phosphorus removal.
a. Acetate b. Glycogen c. PHB d. Polyphosphates e. Glucose
 2. _____ chemical method is used for control of slime growth.
a. Oxidation b. Coagulation c. Disinfection d. Stabilization e. Precipitation
 3. The quantity of O₂ utilized can be accounted for _____ in aerobic treatment process.
a. O₂ used for substrate oxidation c. COD of any substrate which is not degraded
b. COD of biomass d. All of these
 4. Belt filter presses are used in which of the following sludge treatment process?
a. Thickening b. Stabilization c. Dewatering d. Disposal e. Drying
 5. Water pollutants like SO₄, NO₃ and NH₄ are removed by _____.
a. Nano-filtration b. Ultra-filtration c. Micro-filtration d. Reverse osmosis
 6. Flow equalization calculation depends on _____.
a. Diurnal flow b. Loading pattern c. In-line location d. a & b e. a, b & c
 7. Why Na₂S₂O₃ is not widely used in dechlorination process?
a. Problem in uniform mixing c. Pretreatment is required
b. Reaction is pH dependent d. Both a & b
 8. Breakage of C-N bond of purine and pyrimidine is mode of action of _____ disinfectant.
a. Chlorine b. UV radiation c. Ozone d. NaOCl e. Ca(OCl)₂
- Q.2 Answer the following questions. (ANY SEVEN OUT OF NINE) [14]**
1. Differentiate aerobic and anaerobic activity of biological phosphorus removal.
 2. Give expression of total volatile suspended solids and active biomass.
 3. Define role of screen. Write classification of screeners.
 4. Write biochemistry of biological denitrification.
 5. Explain different pretreatment processes used for nano-filtration and reverse osmosis.
 6. What are the application of electro dialysis?
 7. Write classification of chemical feeders.
 8. What are the advantages of flow equalization?
 9. Write applications of chemical unit processes.

(1)

(P.T.O.)

- Q.3 A. What are the adverse effects of ammonia? Write a note on biological nitrification process. [06]
- B. Influent flow rate of aeration tank of GSFC limited effluent treatment plant is $1200 \text{ m}^3/\text{d}$. Influent COD concentration is $400 \text{ g}/\text{m}^3$. Reactor effluent bsCOD and VSS concentration are $20 \text{ g}/\text{m}^3$ and $140 \text{ g}/\text{m}^3$ respectively. Find out the observed yield and the amount O_2 used in gO_2/gCOD and write your comment on general COD balance. [06]

OR

- B. Effluent treatment plant of Amul industry having aeration tank has 450 m^3 capacity. Influent flow rate is 550 m^3 and reactor bsCOD is $70 \text{ g}/\text{m}^3$. Biomass of the reactor and influent nbVSS concentrations are $2800 \text{ g}/\text{m}^3$ and $3000 \text{ mg}/\text{m}^3$. Find out observe yield and active biomass of the treatment process. If the cell debris fraction f_d and k_d is 0.10, Y , k and K_s are $0.40 \text{ gVSS}/\text{gCOD}$, $5 \text{ g bsCOD}/\text{gVSS}$ and $40 \text{ g}/\text{m}^3$ respectively. Write your comments on performance of ETP. [06]

- Q.4 A. What are the objectives of physical unit processes? Write a brief note on bar and fine screens. [06]
- B. Describe coagulation, flocculation, measurement of surface charges and mode of action of polyelectrolytes. [06]

OR

- B. Discuss role of constituents responsible for membrane fouling. Write a brief note on membrane technology used for wastewater treatment process. [06]

- Q.5 A. Who had invented MEE? Illustrate components, process and feeding arrangement of multi effect evaporator. [06]
- B. What are the final products of AOPs? Summarize various processes of advanced oxidation processes. [06]

OR

- B. Write characteristics of ideal disinfectant. Explain mode of action, advantages and breakpoint reaction of chlorine as disinfectant. [06]

- Q.6 A. Why sludge dewatering is essential? Discuss any three sludge dewatering processes in detail. [06]
- B. Explain process and advantages of direct and indirect heat dryers used for sludge. [06]

OR

- B. Write a note on sludge thickening processes. [06]