

[A-28]

**SARDAR PATEL UNIVERSITY**  
**M. Sc. -Integrated Biotechnology – Tenth Semester Examination**  
**Saturday, 25<sup>th</sup> April 2015**  
**Time: 10:30 am to 01:30 pm**  
**PS10CIGEB3: Environmental Engineering**

Total Marks – 70

- Q.1 Mark the right answer of following questions. [08]**
1. In the formula of biomass yield,  $Y = \text{g biomass produced} / \text{g substrate}$  \_\_\_\_\_.  
 a. Oxidized                      b. Consumed                      c. Utilized                      d. All of these
  2. Stefan-Boltzman constant is included in \_\_\_\_\_ sludge heat drying process.  
 a. Conduction                      b. Radiation                      c. Turbulence                      d. Rotary dryer
  3. The quantity of  $O_2$  utilized in ETP can be accounted by considering substrate \_\_\_\_\_.  
 a. Substrate oxidation to  $CO_2 + H_2O$                       c. Substrate reduced to  $CH_4 + H_2O$   
 b. Both a and b                      d. None of these
  4. Dissolved Air Flotation unit is used for the removal of \_\_\_\_\_.  
 a. Small Particles                      c. Coarse particles  
 b. Particles with densities close to  $H_2O$                       d. Removal of suspended solids and colloidal solids
  5. Which disinfectant is responsible for breakage of C-N bonds?  
 a. Ozone                      b. UV radiation                      c. Chlorine                      d. Sodium hypochlorite
  6. \_\_\_\_\_ is the significant disadvantage of sludge drying beds.  
 a. Less chemical consumption                      c. Sensitive to sludge variability  
 b. Require stabilization of sludge                      d. Both b and c
  7. From the following which is NOT essential for selection of sludge dewatering device?  
 a. Type of sludge                      c. Components of dewatering device  
 b. Odor control                      d. Characteristics of dewatering products
  8. Which pollutant cannot be removed by microfiltration process?  
 a. Dissolve constituents                      b. NDMA                      c. Cyst & protozoa                      d. Biological constituents
- Q.2 Answer the following questions. (ANY SEVEN OUT OF NINE) [14]**
1. Define fouling and scaling. Which materials are used in membrane filters?
  2. Write mechanisms and selection criteria for depth filtration process.
  3. Write advantages and disadvantages of flow equalization.
  4. What is the significance of upgrading wastewater treatment plant performance?
  5. Explain nitrogen transformation in biological treatment processes.
  6. Discuss general mode of actions of disinfectants.
  7. Explain oxidation processes of refractory compounds in tertiary treatment process.
  8. Discuss the significance of kinetic coefficient for wastewater treatment processes.
  9. What is Fenton treatment? What are the advantages of Fenton treatment processes in ETP?

- Q.3** A. What is the difference between net biomass and observed yield? Summarize the process and microbiology of biological phosphorus removal. [06]
- B. Activated Sludge Process of dye industry has complete mix reactor which is not having recycle unit. It receives influent with 650bsCOD  $\text{g}/\text{m}^3$  and flow rate of the aeration tank is  $1000\text{m}^3/\text{d}$ . The effluent bsCOD and MLVSS concentration are 50 and  $250\text{g}/\text{m}^3$  respectively. Find out the observed yield and the amount  $\text{O}_2$  used in  $\text{gO}_2/\text{gCOD}$  and write your comment on general COD balance. [06]

**OR**

- B. Calculate observed yield and active biomass fraction of aeration tank of pharmaceutical industry. The reactor bsCOD is  $40,000\text{mg}/\text{m}^3$ , reactor volume is  $145\text{m}^3$  and influent nbVSS concentration is  $80\text{g}/\text{m}^3$ . The influent flow rate and reactor MLVSS concentration are  $1300\text{m}^3/\text{d}$  and  $2800\text{g}/\text{m}^3$  respectively. 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. Write any five applications of physical unit treatment processes. Discuss advantages and disadvantages of various types of bar screens. [06]
- B. How membrane fouling can be controlled? Write pretreatment and applications of nano-filtration and reverse osmosis. [06]

**OR**

- B. What is Zeta potential? Outline the uses of electrolytes and application of coagulants. [06]

- Q.5** A. Enlist characteristics of ideal disinfectant. Describe mode of actions and types of disinfectants. [06]
- B. What are the needs of advanced oxidation process? Briefly explain removal technologies for dissolved organic/inorganic pollutants. [06]

**OR**

- B. What are the main steps of MEE? Write a detailed note on operation of MEE. [06]

- Q.6** A. Outline process, advantages and disadvantages of belt filter press and centrifugation process for sludge dewatering. [06]
- B. What are the objectives of sludge thickening? Discuss any two sludge thickening processes. [06]

**OR**

- B. Write brief notes on the following: [06]
1. Chemical neutralization                      2. Chemical feeding process