

(A-3)

**SARDAR PATEL UNIVERSITY**  
**M. Sc. -Integrated Biotechnology – Tenth Semester Examination**  
**Wednesday, 1<sup>st</sup> November 2017**  
**Time: 10:00 am to 01:00 pm**  
**PS10CIGEB3: Environmental Engineering**

Total Marks – 70

- Q.1 Mark the right answer of following questions. [08]
- Maximum specific substrate utilization rate is equal to \_\_\_\_\_.  
a.  $\mu_m/r_{su}$       b.  $r_{su} \times K_s / X S$       c.  $\mu/Y$       d.  $\mu_m/Y$       e.  $r_g/Y$
  - In chemical oxidation of ammonia \_\_\_\_\_ is the major disadvantage.  
a. Lower  $E^\circ$       b. Production of HCl      c. Production of organochlorine      d. b & c both
  - In Fenton system which statement is NOT correct \_\_\_\_\_.  
a.  $H_2O_2$  is difficult to handle      c. Iron is abundant and non-toxic element  
b. Radiation of  $Fe^{+3}$  ion produce  $Fe^{+2}$       d. Can degrade / mineralize nitrobenzene & 2,4 D
  - Dissolved air flotation unit is used for the removal of \_\_\_\_\_.  
a. Small particles      c. Particles with densities close to  $H_2O$   
b. Coarse solids      d. Removal of suspended solids
  - When there is no recirculation of wastewater treatment, then recirculation factor is \_\_\_\_\_.  
a. 0      b. 1      c. Infinity      d. 0.1      e. None of these
  - Which factor is significant before selecting dewatering device?  
a. Amount of sludge      c. Land filling property of dewatered product  
b. Type of sludge      d. All of these
  - Which factor is important for heat transfer in heat drying?  
a. Velocity turbulence      b. Turbulence and area of wetted surface  
b. Sludge – air interface      d. All of these
  - Grit accumulation in front of bar is one of the disadvantage of \_\_\_\_\_ type of bar screen.  
a. Chain driven screen      c. Reciprocating rake screen  
b. Catenary screen      d. Continuous belt screen
- Q.2 Answer the following questions. (ANY SEVEN OUT OF NINE) [14]
- What is in-line and off-line flow equalization?
  - What are the advantages of heat drying sludge treatment processes?
  - Enlist advanced oxidation processes. Write any two main advantages of AOPs.
  - What is membrane fouling? What are the solutions of it?
  - Differentiate substrate driven and endogenous driven denitrification process.
  - Write any four examples of disinfectant agents with their mode of action.
  - Explain rate of utilization of soluble substrate and biomass yield.
  - Write advantages of membrane technologies.
  - What are the advantages of sludge thickening processes?

- Q.3 A. In textile industry, aeration tank of effluent treatment plant, volume of aeration tank is  $330 \text{ m}^3$  and the influent rate is  $990 \text{ m}^3 \text{ d}^{-1}$ . The influent nbVSS and the reactor bsCOD concentrations are  $2 \text{ g/m}^3$  and  $40 \text{ g/m}^3$  respectively. Aeration tank biomass concentration is  $3300 \text{ g/m}^3$ . If the  $f_d$  and  $k_d$  are 0.10, determine the observed yield and net biomass yield. (Kinetic coefficient values for bsCOD:  $k$  is  $6 \text{ g bsCOD/gVSS}\cdot\text{d}$ ,  $k_s$  is  $50 \text{ mg/l}\cdot\text{bsCOD}$  and  $Y$  is  $0.4 \text{ mgVSS/mg}\cdot\text{bsCOD}$ ) [06]
- B. What are the advantages of biological denitrification? Write stoichiometry and microbiology of nitrogen removal process. [06]
- OR
- B. Write the process and role of microorganisms in biological phosphorus removal. [06]
- Q.4 A. Outline advantages, disadvantages and process of reverse osmosis and micro filtration processes used in wastewater treatment. [06]
- B. Write short notes on: [06]
1. Chemical neutralization
  2. Coagulation and flocculation of wastewater treatment process
- OR
- B. Summarize various physical unit processes used for industrial wastewater treatment. [06]
- Q.5 A. What are the needs of MEE? Write the components, process and types of multi effect evaporator. [06]
- B. Write classification of filtration process. Give an account on depth filtration process used to treat industrial effluent. [06]
- OR
- B. What is the need of dechlorination process? Outline disinfection process of tertiary wastewater treatment process. [06]
- Q.6 A. Why dewatering of sludge is required? Explain types, process, advantages and disadvantages of sludge dewatering processes. [06]
- B. Explain gravity thickening, floatation thickening and centrifugal thickening processes of sludge in detail. [06]
- OR
- B. Write short notes on: [06]
1. Up-gradation of existing effluent treatment plant
  2. Grit chamber

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