



Q.2 Answer the following questions. (ANY SEVEN OUT OF NINE)

[14]

1. What is the significance of calculation of biomass yield and  $O_2$  requirements at ETP?
2. Which are the environmental factors that can influence aerobic biological oxidation?
3. Write importance of grit removal for effluent treatment process.
4. What are the sources of electron donors in biological denitrification process?
5. What are the advantages of sludge thickening process?
6. Which bacteria are involved in biological nitrification? Explain their role with specific equation.
7. What are the applications of membrane technologies?
8. Which steps are required for upgradation of ETP?
9. Write the role of different chemicals in dechlorination process.

- Q.3 A. What are the advantages of biological phosphorus removal? Write a detailed note on biological phosphorus removal by PAOs. [06]
- B. Illustrate rate of utilization of soluble substrate, biomass growth, calculation of total volatile suspended solids and observed yield. [06]

OR

- B. At Surat municipal corporation domestic wastewater treatment plant, activated sludge process has  $1050m^3$  influent flow rate and having nbVSS concentration  $40gVSS/m^3$ . The reactor volume and reactor bsCOD concentrations are  $550m^3$  &  $80g\text{ bsCOD}/m^3$  respectively. The biomass concentration is  $850gVSS/m^3$ . The  $f_d$  and  $K_d$  are 0.10,  $k$  is  $6mg\text{ BOD}/mgVSS$ ,  $K_s$  is  $50mg\text{ BOD}/l$  and  $Y$  is  $0.4mgVSS/mgBOD$ . Find out observed yield, net biomass and write your comments on plant performance. [06]

- Q.4 A. Write short notes on: 1) Advantages and disadvantages of RO & NF [06]  
2) Electrodialysis
- B. What are the purposes of physical unit processes? Give an account on role of different screens in wastewater treatment. [06]

OR

- B. Outline the fundamentals of chemical coagulation treatment process. [06]
- Q.5 A. What is the necessity of MEE? Explain components, process and feed arrangement of MEE. [06]
- B. Enlist different types of depth filters. Describe process of any four depth filters in detail. [06]

OR

- B. Which points should be consider before application of chlorine? Write a note on disinfection process with chlorine compounds. [06]
- Q.6 A. Why dewatering is obligatory in ETP? Explain different dewatering processes of sludge with their pros and cons. [06]
- B. Differentiate convection and conduction with respect to sludge drying. Write a note on sludge heat drying processes. [06]

OR

- B. Write short notes on: 1) Flow equalization [06]  
2) Chemical neutralization