**ENVIRONMENTAL MICROBIAL BIOTECHNOLOGY (MICR 307) 2014**

**TUTORIAL 3**

1. Modern water treatment processes provide barriers, or lines of defense, between the consumer and water-borne diseases. Discuss the various processes involved in the conventional treatment of drinking water.
2. Write short notes on the following as applicable to water treatment systems:
   1. Coagulation
   2. Flocculation
   3. Sedimentation
   4. Filtration
   5. Disinfection
3. Biofilms may appear as a patchy mass or as uniform layers in some pipe sections.

Discuss the process of biofilm formation and the associated problems in water distribution systems.

1. Describe briefly the various factors that may influence the growth of bacteria in water distribution systems.
2. Define the following terms:
   1. Assimilable organic carbon.
   2. Coliform growth response.
   3. Biodegradable dissolved organic carbon.
   4. Microbial biofilms
   5. Glycocalyx.

6. What is Coliform growth response test? In a bioassay using *Enterobacter cloacae***,** to determine the potential of coliforms re-growth in a treated drinking water, the cell density of *E. cloacae* obtained at day 0 and day 5 was 100 and 250 Cfu/ml, respectively. Comment on whether or not this water can be supportive of coliform re-growth during distribution.

1. Define the following terms:

(i) Sterilization (ii) Sanitizer (iii) Disinfectant

(iv) Thermal death time (v) Decimal reduction time (D value)

(vi) Z value (vii) Photoreactivation

(viii) Photodynamic action (ix) C . t values (x) I . t values

1. What is the significance of z values of disinfectants? Describe the kinetics of disinfectant action in killing microorganisms and explain why all microorganisms are not inactivated according to first-order kinetics?
2. Explain the effects of temperature and pH on chlorine disinfection. Outline both the **physical** and **cell-mediated** factors that determine the effectiveness of a disinfectant.

10 (a) Write short notes on the application and the mechanism of action of the following

disinfectants in the removal of water-borne enteric bacteria and viruses:

1. Chlorine

(ii) Ozone

(iii) Metal ions

(iv) UV

(v) Gamma and high-energy irradiation

11 What are the relative advantages and disadvantages of the use of the following

disinfectants in the removal of pathogens in water?

1. Ozone

(ii) Chloroamines

(iii) Chlorine dioxide

(iv) UV

(v) Chlorine