

MID SEMESTOR EXAM-II

Attempt all questions:

Marks:25

ASSUME ANY MISSING DATA

1. A completely mixed activated sludge process is to be used to treat wastewater flow of 750 m³/hr having a soluble BOD₅ of 280 mg/l. The conc. of soluble BOD₅ escaping the treatment is 25 mg/l. The saturation constant =110 mg/l, endogeneous decay coeff is 0.07 day⁻¹, yield coeff is 0.6, max specific substrate utilization rate; k=5 day⁻¹ and the conc of MLVSS is 2100 mg/l. Density of air at 25⁰C= 1.185 kg/m³; Calculate:

- a) the mean cell residence time ----(1)
- b) the hydraulic retention time(1)
- c) the treatment efficiency and F/M ratio(1)
- d) the volume of aeration tank.....(1)
- e) P_x and mO₂ (in kg/day).....(3)

If air is supplied to the plant at 25⁰C and the oxygen transfer efficiency is 15%, BOD₅ is 72.5% of the ultimate BOD, calculate the volume of air supplied to the plant in m³/day. ... (3)

CO5

2. Explain the following in detail:

- a) Types of solid wastes
- b) Collection and transportation of MSW
- c) Sanitary landfill and incineration
- d) Pyrolysis and gasification

CO6 (8)

3. a) A town discharges 19,000 m³/day of sewage into a nearby stream. The stream has a minimum flow of 0.5 m³/s, depth 3 m and velocity 6 kmph. The data available is:

	TEMP ⁰ C	DO (mg/l)	BOD ₅ (mg/l)
STREAM:	20	8.5	10
SEWAGE:	25	1.0	200

The deoxygenating constant (k₁) evaluated at 20⁰C is 0.32 day⁻¹. Determine the critical oxygen deficit, D_c, critical time t_c and its location, x_c.

Data given: $k_{1,T} = k_{1,20} \theta^{(T-20)}$; $\theta = 1.056$, and $k_{2,T} = k_{2,20} \theta^{(T-20)}$; $\theta = 1.047$

Saturation concentration of DO = 9.0 mg/l for temperature 21⁰C to 22⁰C

CO4 (7)