JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST III EXAMINATION (MAY- 2019)
B. Tech. (VI- SEM.)

COURSE CODE: 10B11CE613   MAX. MARKS: 35

COURSE NAME: Sewage Treatment and Disposal

COURSE CREDIT: 4   MAX. TIME: 2.0 HRS

Note: Attempt all Questions. Carrying of mobile phones during exams will be treated as case of unfair means. Assume suitable data if required.

1. Design a completely mixed ASP system to treat a flow of 8MLD with an influent BOD concentration of 350 mg/l and with a desired effluent concentration of 10mg/l. The following data is made available (a) primary treatment of wastewater will be done (b) F/M = 0.8 (c) MLVSS = 3500 mg/l (d) RAS = 10000 mg/l and MLVSS/MLSS = 0.85 **(8)**

2. An ASP process was designed to treat a flow of 35000 m^3/d. The volume of the aeration tank was determined to be 10900 m^3 and the influent and the effluent BOD concentrations were 250 mg/l and 20 mg/l respectively. The MLSS concentration was 2500 mg/l and effluent suspended solids concentrations were 30 mg/l. The RAS concentration was 9700 mg/l and quantity of waste sludge is 220 m^3/day. Using the information given, calculate (a) BOD removal efficiency (b) Hydraulic Retention time (c) F/M ratio and (d) Mean cell residence time (or sludge age) **(5)**

3. A municipal wastewater is having a flow of 7570 m^3/d and BOD concentration of 250 mg/l and is to be treated using a two stage trickling filter. The desired effluent quantity is 25 mg/l. Assume depth of both filters as 1.83 and recirculation ratio as 2. Assume 35% removal of BOD in PST. Use NRC equation. Assume that the overall efficiency (E) is related to the stage I efficiency (E_1) and stage II efficiency (E_2) as $E = E_1 + E_2*(1- E_1)$ and $E_1 = E_2$. The BOD loading for stage two filter can be expressed as $W_2 = W_1*(1- E_1)$ **(8)**

4. Write short notes on (a) '*sloughing process*' in attached growth system (b) neat sketch showing the bacterial life cycle (c) problems associated with sludge thickening system (d) operational problems in RBC **(10)**

5. A settling analysis is run on the contents of a thickener with results as shown in the table with a solid concentration of 6000 mg/l. The sludge will be settled at a rate of 0.055 m^3/sec with a desired underflow concentration of 19000 mg/l. Determine the volume of the thickener **(4)**

Sludge Interface Height (cm)	40	30	20	18	15	13	11	8	7.5	7.5
Time (min)	0	5	10	11	13	15	18	19	35	40