Exam Date & Time: 21-May-2022 (10:00 AM - 01:00 PM)

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

SIXTH SEMESTER B.TECH END SEMESTER EXAMINATIONS, MAY 2022
DESIGN OF BIOLOGICAL TREATMENT PROCESSES [BIO 4052]

Marks: 50 **Duration: 180 mins.**

A

Answer all the questions.

Instructions to Candidates:
Answer ALL questions Missing data may be suitably assumed

1) Explain the purpose of flocculation and the various means for flocculation in wastewater treatment (3)

A)

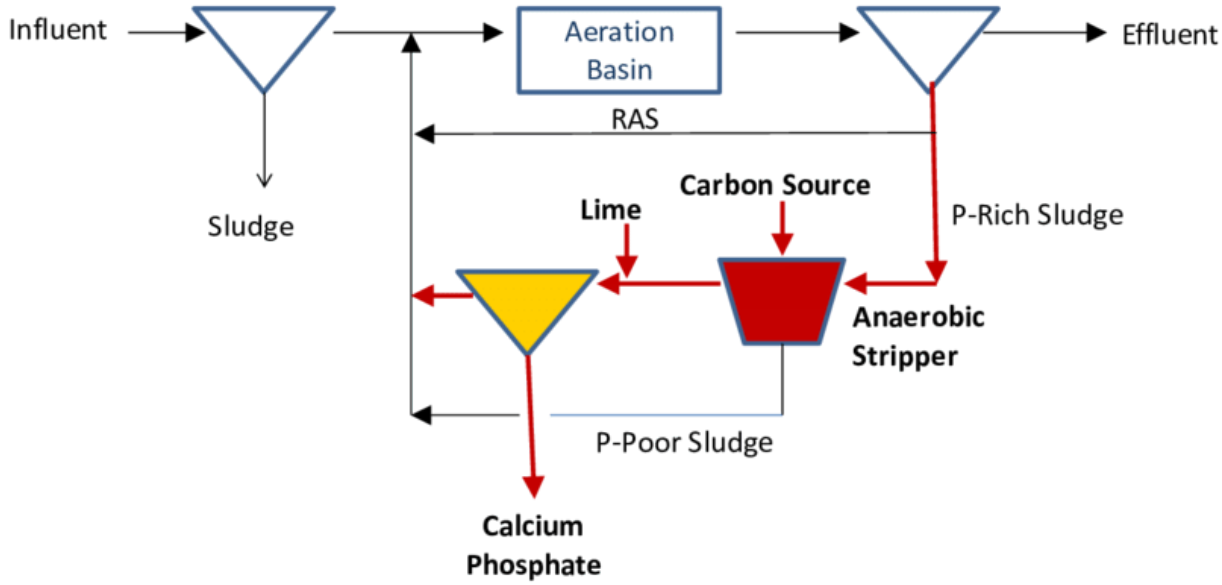
B) What is bulking in active sludge process? What are the possible steps to prevent bulking? (3)

C) Explain Sequencing Batch Reactor (SBR) process (4)

2) Define and explain the following parameters of an active sludge process
(i) Process Efficiency (E)
(ii) Food to microorganism ration (F/M)
(iii) specific utilization rate (U) (3)

A)

B) Explain the salient features of Phostrip process for Nutrient removal



(4)

C) With a neat flow diagram, explain the microbiological steps in anaerobic degradation of starch (3)

3) Compute the equalization basin volume for the following set of data; provide 20% excess capacity to the computed maximum.

A)

Time	Flowrate, m3/s	Time	Flow rate m3/s
Midnight- 2 AM	0.32	12 Noon- 2 PM	0.505
2-4 AM	0.230	2-4 PM	0.405
4-6 AM	0.2	4-6 PM	0.425
6-8 AM	0.305	6-8 PM	0.465
8-10 AM	0.51	8-10 PM	0.5
10-12 AM	0.525	10-12 midnight	0.445

(4)

B) The following results were obtained for a wastewater treatment sample taken at a facility. All the tests were performed using a sample size of 50 mL. Determine the concentration of TS,TVS,TSS,VSS,VDS(all in mg/L) (3)

Tare mass of evaporating dish	53.5435g
Mass of evaporating dish plus residue after evaporation (105^0 C)	53.5765g
Mass of evaporating dish plus residue after ignition at 550^0 C	53.5565 g
Tare mass of Whatman GF/C filter	1.5433 g
Mass of Whatman GF/c filter plus residue after drying at 105^0 C	1.5653 g
Mass of Whatman GF/C filter plus residue after ignition at 550^0 C	1.5502 g

C) Explain the computation of sedimentation tank area based on solid flux analysis (3)

4) Explain the process of Trickling filters for BOD reduction (3)

A)

B) What are the characteristics of an ideal disinfectant? (3)

C) Describe the Breakpoint Chlorination plot using free available chlorine as a function of Cl_2 added (4)

5) What are the advantages and disadvantages of UV disinfection? (2)

A)

B) Highlight the dissolved air floatation process (3)

C) The following are the factors that affect the disinfection process. Describe their role (i) contact time (ii) concentration and type of chemical agent (iii) intensity and nature of physical agent (iv)Temperature (v)number and type of microorganism (vi)nature of suspending liquid (5)

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