

### **II SEMESTER M.TECH. END SEMESTER EXAMINATIONS APR 2018**

## SUBJECT: INDUSTRIAL WASTEWATER ENGINEERING [CHE 5235]

REVISED CREDIT SYSTEM (25/04/2018)

Time: 3 Hours

#### MAX. MARKS: 50

#### Instructions to Candidates:

- ✤ Answer ALL the questions.
- ✤ Missing data may be suitable assumed.

1A.	Derive an equation for terminal settling velocity of a discrete sand particle when the flow is laminar.	06
1B.	Write a short note on perikinetic and orthokinetic flocculation.	02
1C.	The effluent contains considerable amount of NaCl from which Na+ ions should be removed by strong acid exchange resin. How will you determine the separation constant for the said condition?	02
2A.	Consider an activated sludge process without recycle. Derive an expression to calculate the quantity of biomass required when other parameters such as yield, influent and effluent BOD, flow rate, sludge retention time and endogenous decay coefficient are known.	05
2B.	Discuss about the removal of nitrogen based nutrients by biological treatment processes.	04
2C.	What will be the impact of presence of algae in aerobic and anaerobic treatment processes?	01
3A.	Illustrate the steps involved in anaerobic biological treatment processes with a schematic representation.	03
3B.	Write a short note on sludge management process practiced in industries with a schematic representation.	03
3C.	Discuss about the mechanism of BOD removal from wastewater using a trickling bed filter.	04

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	Milest and the advantage and disadvantage of using anomalated						
3D.	sludge over flocculent sludge in UASB reactors?						
4A.	sludge over Two adsorb adsorbate C studies.	flocculent s ents namely individually <b>C</b> o (mg/L) 50 100 150 200 250 300 400	ludge in UASB r / A and B were u /. Below are the Ce (n Adsorbent A 3.57 9.88 17.43 25.90 33.57 45.14 76.10	reactors? used for adsorbin results of the econ <b>ng/L)</b> Adsorbent B 2.89 7.79 13.05 20.36 30.68 41.69 57.67	ng an uilibrium	01	
	The total volume of the aqueous solution was 100 mL and 0.5 g of the adsorbent was added to carry out the adsorption studies. Evaluate the maximum monolayer capacity (q <sub>m</sub> ) of both the adsorbents and justify which was a better adsorbent based on your result. The linear form of Langmuir isotherm is given by $\frac{1}{q_e} = \frac{1}{q_m K_L C_e} + \frac{1}{q_m}$						
4B.	Write a short note on the concept of zero liquid discharge.						
5A.	The effluent from a leather tanning industry has the following characteristics: COD: 575 kg; BOD: 369 kg; Suspended solids: 125 kg; Cr <sup>6+</sup> : 6 kg. Suggest the suitable treatment operations in a proper sequence to treat the above mentioned wastewater.						
5B.	Explain the mechanism of photocatalysis with a neat diagram.						
5C.	Given a dead end membrane filtration equipment, how will you determine its flux?						