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VI SEMESTER B.TECH. (CIVIL ENGINEERING)
END SEMESTER EXAMINATIONS, APRIL/MAY 2017
SUBJECT: WASTEWATER MANAGEMENT [CIE 3202]
REVISED CREDIT SYSTEM

(25/04/2017)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A.	Discuss the limitation of BOD test. What are the significance of BOD/COD ratio in wastewater treatment?	**4**
1B.	Explain the environmental significance of the following in the wastewater a. Surfactants b. Nitrogen content	**3**
1C.	With the neat Flow diagram explain the treatment process given to the large cities.	**3**
2A.	A sewage treatment plant is expected to treat a maximum flow of 15MLD with a flow velocity of 0.25m/s. Settling velocity of particles is 0.01 m/s. Grit quantity $0.05m^3$/ $10m^3$ at peak flow. Considering the given data design the dimensions a Horizontal Flow Grit Chamber	**4**
2B.	Show the classification of sedimentation tank. Explain the working of rectangular sedimentation tank in detail.	**3**
2C.	Explain the biological process involved in attached growth process in trickling filter	**3**
3A.	Design two stage high rate trickling filter by using NRC formula for the following data: Waste water flow =6MLD Recirculation ratio=2 BOD of raw waste water=250mg/L BOD removal in primary clarifier= 35% Organic loading rate= 1kg BOD/m^3-D	**5**
3B.	Design a RBC module to treat a primary settled sewage for a town with population 80000 with an average rate of water supply as 120LPCD. Hydraulic loading rate = $130L/m^2$-d, Diameter of disc is 4.5m,Center to center spacing=15mm	**3**
3C.	Discuss briefly about growth phases of organism in a biological system.	**2**
4A.	With the help of a neat diagram explain anaerobic process of sludge digestion in detail	**5**
4B.	Explain the purpose of providing secondary sedimentation in biological treatment	**2**
4C.	Draw a generalized flow diagram of sludge treatment adopted in sewage treatment plants	**3**

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<table>
<tr><td>5A.</td><td>Briefly discuss the advantages and disadvantages of aerobic sludge treatment</td><td>2</td></tr>
<tr><td>5B.</td><td>What is re-oxygenation? What are the factors that affect re-oxygenation?</td><td>3</td></tr>
<tr><td>5C.</td><td>A wastewater treatment plant disposes of its effluent in a surface stream. Characteristics of the stream and effluent are given in the table.
a) What will be the dissolved oxygen conc. in the stream after 2 days?
b) What will be the lowest dissolved oxygen concentration because of the waste discharge

<table>
<tr><th>Parameter</th><th>wastewater</th><th>stream</th></tr>
<tr><td>flow (m^3/s)</td><td>0.2</td><td>5</td></tr>
<tr><td>Dissolved oxygen, mg/L</td><td>1</td><td>8</td></tr>
<tr><td>Temperature, °C</td><td>15</td><td>20.2</td></tr>
<tr><td>BOD_5 at 20°C, mg/L</td><td>100</td><td>2</td></tr>
<tr><td>Oxygen consumption rate (K_1 at 20°C) /day</td><td>0.2</td><td>-</td></tr>
<tr><td>Oxygen reaeration rate (K_2 at 20°C) /day)</td><td>-</td><td>0.3</td></tr>
</table>
Assume saturation DO as 8.57mg/L</td><td>5</td></tr>
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