Reg. No.



## MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL (A constituent unit of MAHE, Manipal)

## VI SEMESTER B.TECH. (CIVIL) END SEMESTER EXAMINATIONS APRIL /MAY 2019

## SUBJECT: WASTE WATER MANAGEMENT [CIE 3202]

Date of Exam:

Time of Exam:

Max. Marks: 50

## Instructions to Candidates:

Answer ALL the questions & missing data may be suitably assumed

1A.	What is the purpose of using equalization tank? Explain the classification of equalization tank based on different flow type			
1B.	A screen chamber is to treat maximum flow of 0.2 m3/sec of domestic waste water. Approach channel dimension are $2 \times (B) 0.6 \times (D) 0.5m$ . Dimensions of the bars are 10mm x 50mm with clear spacing's of 28mm. Determine the number of bars to be provided and check for head loss through screens.			
1C	Write a note on physical characteristics of waste water			
2A.	With a neat flow sheet show the different units in sludge treatment. Explain about anaerobic sludge digestion process in detail			
2B.	Determine the depth of the trickling filter, diameter, volume of filter media and the efficiency of the treatment of a standard rate trickling filter, from following data: quantity of sewage = $3.8 \times 106 \text{ l/day}$ ; BOD of raw sewage = $140 \text{ mg/lt}$ ; rate of organic loading = $150 \text{ g/m3/day}$ ; rate of surface loading = $2000 \text{lts/m2/day}$ .			
3A.	Design a primary sedimentation tank of rectangular shape for a town having population of <b>59000</b> with water supply of <b>180</b> liters per capita per day. Assume : detention period = 2hrs, width : length= 1:4, surface loading= $1375 \ l/m2/hr$			
3B.	What are the objectives of sedimentation tanks in waste water treatment? What is the necessity of sedimentation aided with coagulation?			
<b>3</b> C	Differentiate between oxidation ditch and oxidation pond.			
<b>4</b> A	An ASP is operating at an equilibrium with the following information. Wastewater Data: Flow is 500 m <sup>3</sup> /hrs; BOD <sub>in</sub> is 150 mgL <sup>-1</sup> ; BOD <sub>out</sub> is 10 mgL <sup>-1</sup> . Aeration Tank Data: HRT is 8 hrs; CRT is 240 hours; Volume is 4000 m <sup>3</sup> and MLSS is 200 mgL <sup>-1</sup> . Calculate; i. Food to biomass ratio (in kg BOD per kg biomass per day) in the aeration tank. ii. The mass in (kg/day) of solids wasted from the system is?			
4B.	Define the followingii. De-Oxygenationii. MLSSiv. Suspended Growth Systemv. SVIVI	5	CO4	

5A.	List and explain the factors affecting the self-purification.			CO5
5B.	What is reoxygenation? Discuss the factors upon which rate of reoxygenation depends.			CO5
5C	A city discharges 20000 m <sup>3</sup> /day of sewage is Determine DO deficit profile for 60 km from River 5-day BOD at 20°C = $3.4 \text{ mg/L}$ Temperature 23 °C DO = $8.2 \text{ mg/L}$ Velocity = $0.25 \text{ m/sec}$ , $k_r=0.4 \text{ d}^{-1}$ , $k_d = 0.23$	into a river whose rate of flow is 0.7 m <sup>3</sup> /sec m the following data at an interval of 20 km. Sewage effluent from STP 5-day BOD at 20°C = 45 mg/L Temperature 26 °C DO = 2.0 mg/L 8 d <sup>-1</sup> Saturation value of DO is 8.57 mg/L	5	C05