

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: BE
BRANCH: BIOTECH

SEMESTER: VII
SESSION : MO/2018

SUBJECT : BT7021 BIOLOGICAL WASTE MANAGEMENT

TIME: 1.5 HOURS

FULL MARKS: 25

INSTRUCTIONS:

1. The total marks of the questions are 30.
 2. Candidates may attempt for all 30 marks.
 3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. The missing data, if any, may be assumed suitably.
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- Q1 (a) Classify sewage water based on their colours. [2]
(b) Why it is important to determine the temperature of a wastewater? [1]
(c) Determine COD for the compound $C_{12}H_{22}O_{11}$. [2]
- Q2 (a) Justify the use of Bar-screen as preliminary treatment method. [2]
(b) Draw a labelled diagram of a complete wastewater treatment process. [3]
- Q3 (a) Write Stoke's law of settling velocity for Reynolds number less than 1. [1]
(b) Design a grit chamber of rectangular cross-section. Following information is provided: [4]
Design Flow (Q): 50 MLD; settling velocity of the smallest particle to be removed completely is 0.0236 m/s; Specific Gravity of particles (Ss): 2.65; Horizontal mean flow velocity (V): 0.30 m/s; Theoretical depth (D): 1.4 m; Calculate the dimensions of the grit chamber. While designing the actual grit chamber, add 25 percent to the depth for grit collection, and 0.25m freeboard. Also add 50 percent to the theoretically calculated length. Value of 'n' is 0.020. Assume that the volume of grit in the wastewater is 0.15 m^3/ML , and 100 percent grit removal in the grit chamber.
- Q4 (a) With the schematic diagram, describe the sequential batch reactor (SBR) system. [3]
(b) Define sludge. Why it is called activated? [1+1]
- Q5 (a) How can you convert anaerobic lagoon into aerobic one? [2]
(b) Wastewater flow is 3500 m^3/d in winter and 6500 m^3/d in summer. Winter temperature is 5 °C and summer is 40 °C. BOD_5 is 200 mg/L with 70% being soluble. The reaction coefficient k is 0.23 d^{-1} at 20 °C, and the value of temperature coefficient is 1.06. Find volume of facultative lagoon to remove 90% of the soluble of BOD. [3]
- Q6 (a) Draw a labelled diagram of a Trickling Filter. [3]
(b) Derive the performance equation of a trickling filter considering second order kinetics. [3]

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