

**BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE**  
**II SEMESTER 2017-2018**

CE F342

Water and Wastewater Treatment      Dated: 9.3.2018  
**Mid Semester Test (Open Book)**

Max. Marks: 90

Duration: 90 minutes

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**Note: Only class notes are allowed, No Xerox material is allowed.**

1. Primary settling tank of 25 m diameter with 2.2 m side water depth has a weir located on the periphery. For a water flow of 12000 m<sup>3</sup>/day, calculate:
  - a) Surface area and volume
  - b) Overflow rate
  - c) Detention time
  - d) Weir loading
  - e) Sketch of settling tank

[Take slope of hopper zone of settling tank as 1V: 12H, allowable weir loading = 125 m<sup>3</sup>/d/m] [3+3+3+7+4]
  
2. Water is pumped from a low level reservoir to a high level reservoir through a reservoir to a high level through a main pipeline of 0.4 m diameter and 1200 m length. The pump is located at the low level reservoir. At a point along the main line at a distance of 450 m from the high level reservoir, a branch of 0.3 m diameter and 350 m length takes off to discharge 190 l/s in to the atmosphere. Given the following data:
  - a) Level of water in high level reservoir = + 40.0 m
  - b) Level of water in the open end of the 0.3 m diameter branch line = + 34.5 m
  - c) Level of water in low level reservoir = + 29.0 m
  - d) Darcy's frictional coefficient for both pipes = 0.03

Determine the flow rate in to the high level reservoir and the theoretical H.P. of the pump, assuming the delivery valve of the pump to be at +32 m. [20]
  
3. A Flocculation chamber 30 m long, 12 m wide and 4.5 m deep is to treat 70 MLD of water. It is equipped with 12 m long, 0.3 m wide paddles supported parallel to width and moved by four horizontal shafts which rotate at a speed of 2.5 rpm. The centre line of paddles is 1.8 m from the shaft which is at mid depth of tank. Two paddles are mounted on each shaft, one opposite to another. If the mean velocity of water is 1/4<sup>th</sup> velocity of paddles, find
  - a) Power consumption
  - b) Time of flocculation
  - c) Value of G
  - d) Sketch of flocculation unit and paddles

Take kinematic viscosity of water = 1.31x 10<sup>-6</sup> m<sup>2</sup>/s, C<sub>D</sub> = 1.8 [4+6+4+6]
  
4. Compute the population of year 2010 and 2018 for a city whose population in the year 1930 was 30,000 and in the year 1970 was 48000. Make use of geometrical growth method. [10]
  
5. Explain the following with suitable sketches wherever necessary [4x5=20]
  - a) If you have to make a choice between Slow Sand Filter and Rapid Sand Filter, which one you will prefer and why?

- b) What to you understand by non consumptive usage of water, explain.
- c) Make the sketches of different types of Screens and explain.
- d) We have visited the sewage Treatment Plant of BITS Pilani, explain the process of the plant.

**Paper ends**