TCE 505

Roll No.											

Odd Semester Examination, 2019-20
B. Tech: Civil (5th Semester)
Environment Engineering II

M.M:100

Time: 3:00hr

Total no. of printed pages: 2

Note : (i) Attempt ALL questions.
      (ii) In case of numerical problems assume data whenever not provided.

4X5=20

Q1. Attempt any four of the following

(a) Define the following terms:
Refuse, Garbage, Sewer, Sewage, sewerage system and Night soil.

(b) What do you understand by dry weather flow and storm water flow? Discuss in brief, the factors affecting dry weather flow.

(c) A mixed liquor with 1500 mg/L of suspended solids has the settled volume of 200 ml from a litre of this mixed liquor. Calculate its sludge volume index (SVI). Is it safe or not?

(d) What is grit? Why should grit be removed from wastewater? Mention the design criteria of grit chambers.

(e) Say a raw wastewater sample from wastewater treatment plant has 500 mg/L 5-day BOD at 20°C (due to carbon only) with reaction constant (k = 0.23 per day at 20°C). Calculate ultimate BOD at 20°C and 30°C respectively. Mention the comment on observed values of ultimate BOD.

(f) What is screening? And briefly explain their types.

4X5=20

Q2. Attempt any four of the following

(a) Write short notes on UASB process.

(b) Draw the flow diagram showing sequence of various treatment units of a typical wastewater treatment plant. Label these treatment units sequentially.

(c) Briefly discuss about the physical and chemical characteristics of sewage.

(d) What is self cleansing velocity? Explain its importance in the design of sewer.

(e) Define hydraulically efficient section. Find the relation between two hydraulically efficient sections for a square section of one sewer (width b) and the diameter of a circular section of another sewer (diameter d).

(f) Write the various relations for estimating the storm water flow in the sewer.

2x10=20

Q3. Attempt any two of the following

(a) Discuss the design criteria of circular sewer. Write the generalize expression for the hydraulic characteristics of a circular sewer sections running partially full.

(b) Design a circular sewer running half full at a flow rate of 500 litres per second and laid at an invert slope of 00001. Use manning's equation and coefficient η= 0.015.

(c) Describe various types of water carriage system. Mention the advantages and disadvantages of each system.

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Q4. Attempt **any two** of the following   **2x10=20**

  (a)   Discuss the process of aerobic and anaerobic wastewater treatment. Explain the different methods for aerobic process in biological treatment.

  (b)   Determine the dimensions of a high rate trickling filter for the following data:
  (a) Sewage flow = 2.5 MLD   (b) Recirculation ratio = 1.5
  (c) BOD of raw sewage = 250 mg/L   (d) BOD removed in primary tank = 25%
  (e) Final effluent BOD desired = 30 mg/L.
  By what percentage the diameter of the filter will have to be changed if it is to be designed as a standard rate trickling filter for the above dataset.

  (c)   Explain attached growth system and Suspended growth system with suitable example. Mention the operational difficulties in an activated sludge process? Explain each of them.

Q5. Attempt **any two** of the following   **2x10=20**

  (a)   Classify the solid waste with suitable example. Also explain the different methods of disposal of solid wastes.

  (b)   Design a septic tank for 400 persons with a water supply of 125 litres per capita per day. Assume any data suitably and mention it. If percolation rate is 15 minute, find the effective percolation area required.

  (c)   Population of a town is 20,000 with an assured water supply of 135 lpcd. BOD of the waste water is 150 mg/L. Design the most suitable waste treatment system (without power supply) for the town.