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CE 131702 NR

Roll No. of candidate

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2312 / 12 2021

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B.Tech. 7<sup>th</sup> Semester End-Term Examination

CE

ENVIRONMENTAL ENGINEERING – II

(New Regulation)

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks  
for the questions.

Answer question No. 1 and any *four* from the rest.

1. Fill in the blanks :

(10 × 1 = 10)

- \_\_\_\_\_ is a term used to indicate the waste water from bathroom, kitchen, washing places etc.
- The sewer which receives the sewage from the collecting system and conducts it to a point of final discharge is known as \_\_\_\_\_.
- The velocity at which the solid particles remain in suspension in the sewer is called \_\_\_\_\_.
- The Hydraulic Mean Radius for a circular sewer of diameter 1 m, when running full is \_\_\_\_\_.
- The oxygen sag at any point of time is the difference between \_\_\_\_\_ and \_\_\_\_\_.
- The disposal technique whereby the treated waste water is discharged in large static water bodies or in streams or rivers is known as \_\_\_\_\_.

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- (g) The method in which decomposition of organic or inorganic matter occurs in absence of oxygen is termed as \_\_\_\_\_ process.
- (h) The process by which suspended solids in water are separated by the action of gravity is called \_\_\_\_\_.
- (i) The ratio of recirculated flow to the flow of raw sewage is called \_\_\_\_\_.
- (j) The sewer appurtenances used to connect a high level branch sewer and low level main sewer is called \_\_\_\_\_.
2. (a) Define sewer appurtenances. Name five important sewer appurtenances used in sewerage system. (5)
- (b) Draw a neat sketch of a deep manhole and label its different components. (10)
3. (a) Describe in brief the various types of water carriage system stating three advantages and disadvantages of each. (10)
- (b) Define time of concentration and time of entry. What is the intensity of rainfall if the duration of storm is 20 minutes? (5)
4. (a) Find the minimum velocity and gradient required to transport coarse and through a sewer of 60cm diameter with sand particles of 1mm diameter and specific gravity 2.66. Assume  $\beta = 0.06$  and  $f = 0.02$ . Assume the sewer run half full. Take  $N = 0.012$  and  $\theta = 180^\circ$ . (10)
- (b) Name the different shape of non circular sewer sections. Draw neat sketch of any two of them. (5)
5. (a) Define B.O.D and C.O.D? The initial dissolved oxygen and final dissolved oxygen of a waste water sample are 11 ppm and 7 ppm respectively. The final dissolved oxygen content was obtained after the waste water sample was diluted with dilution water having dilution factor 150. Compute the BOD of the waste water sample? (5)
- (b) For a waste water sample, it was found that the 5-day BOD at  $30^\circ\text{C}$  temperature and  $20^\circ\text{C}$  temperature was found to be 233.8 mg/L and 200.0 mg/L respectively. Determine the percentage change in BOD due to the rise in temperature from  $20^\circ\text{C}$  to  $30^\circ\text{C}$ . (5)
- (c) A combined system serving 12000 persons have 80 gm of per capita daily BOD. Find the total BOD load on the sewer system. (5)

6. (a) Define oxygen sag, de-oxygenation and Re-oxygenation. Give appropriate graphical representation of each. (5)
- (b) What do you understand by sewage sickness of soil? Explain how sewage sickness of soil can be skillfully prevented. (5)
- (c) Write a short note on preliminary treatment of wastewater prior to its disposal. (5)
7. (a) Define Oxidation pond and Aerated Lagoon? Mention three merits and demerits of conventional trickling filter. (2 + 3 = 5)
- (b) Define Recirculation ratio and recirculation factor. Assuming that there is no recirculation feature in a filter, what would be its Recirculation ratio? (2 + 3 = 5)
- (c) The MLSS concentration in an aeration tank is 2000 mg/L and the sludge volume after 30 minutes of settling in a 1000 ml graduated cylinder is 176 ml. Determine Sludge Volume Index (SVI) and Sludge density Index (SDI). (2.5 + 2.5 = 5)

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