

B. TECH.
(SEM-VI) THEORY EXAMINATION 2018-19
ENVIRONMENTAL ENGINEERING

Time: 3 Hours**Total Marks: 70****Note:** Attempt all Sections. If require any missing data; then choose suitably.**SECTION A****1. Attempt all questions in brief. 2 x 7 = 14**

- a. What is a design period?
- b. Write the name of common impurities found in water.
- c. Name the different pipe appurtenances.
- d. Explain BOD and COD.
- e. Enumerate the total amount of solid waste present in water.
- f. Calculate one day 37°C BOD of sewage sample whose 5 days BOD is 100mg/l.
- g. What are the effects which occur on water after filtration?

SECTION B**2. Attempt any three of the following: 7 x 3 = 21**

- a. What are the various methods to forecast the population growth in an area? Explain suitability of any four methods.
- b. A storage reservoir is situated at a distance of 6 km from a city of 3 lakh population. The total loss of head from the source to the city is not exceed 20 m. taking the daily demand of 200 l/capita/day, pumping is to be done for 12 hours only, determine the size of supply main by
 - i. Darcy – Weisbach formula taking coefficient of friction as 0.015
 - ii. Hazen Williams formula taking C = 130. Assume minor losses = $10 \frac{V^2}{2g}$.
- c. Explain the importance of determining solids dissolved in water. How do you determine the amount of solids dissolved in waste water.
- d. Write the equation for temperature dependence of BOD. If the BOD₅ of a waste is 103 mg/L and the BOD₂₀ (corresponds to the ultimate BOD) is 160 mg/L, what is BOD rate constant?
- e. Elaborate the various water supply systems with reference to Indian context.

SECTION C**3. Attempt any one part of the following: 7 x 1 = 7**

- (a) The average sewage flow from sewage is 80×10^6 L/D. If the average 5 day BOD is 285 mg/l. Calculate the total 5 day oxygen demand in kg and population equivalent of sewage. Assume per capita demand of BOD per day is 75 g.
- (b) Write a note on various shapes of sewer sections.

4. Attempt any one part of the following: 7 x 1 = 7

- (a) Explain in detail absorption and ion exchange process of treatment of waste water.
- (b) Discuss in detail the ways to remove hardness of waste water and the chemicals

involved in hardness.

5. Attempt any *one* part of the following:

7 x 1 = 7

- (a) Why are coagulants used in waste treatment? List various coagulants used in the process.
- (b) A stone-ware sewer, 30 cm in diameter is laid at a gradient of 1 in 100. Using $N = 0.013$ in manning's formula, calculate the velocity and discharge when sewer is running full.

6. Attempt any *one* part of the following:

7 x 1 = 7

- (a) What do you understand by per capita demand? How is per capita demand for a community estimated? Also explain the factors which affect the per capita demand.
- (b) Explain activated sludge treatment in detail.

7. Attempt any *one* part of the following:

7 x 1 = 7

- (a) What are gravity and pressure conduits? Why pressure conduits are most commonly used for conveying water from distant sources to the town for supply?
- (b) What are the main sources of water pollution in industrial township?