Paper Id: 100261 Roll No.

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 37^0C 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 $V^2/2g$.
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 BOD_5 of a waste is 103 mg/L and the BOD_{20} (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 $x10^6$ 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?