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B TECH
(SEM IV) THEORY EXAMINATION 2017-18
WATER SUPPLY AND TREATMENT ENGINEERING

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

a. Write the advantages and disadvantages of BOD test.
b. Enlist any five types of water borne diseases and their sources.
c. What is residual chlorine?
d. Write the advantages of membrane operation.
e. What do you mean by back washing?
f. Why are continuous types of settling tanks in common use at present?
g. What is a Hume Pipe?
h. Write the importance of water supply scheme.
i. What is surge in a pipe network?
j. Why is the population forecast necessary in the design of public water supply schemes?

SECTION B

2. Attempt any *three* of the following: 10 x 3 = 30

a. Design a circular sewage sedimentation tank for a town having population of 40,000. The average water demand is 140 letres/capita/day. Assume that 70% water reaches at the treatment unit and the maximum demand is 2.7 times the average demand.
b. What are the objectives of disinfection of water? Compare the properties of any three disinfectants. Also write the characteristics of good disinfectants.
c. Name the various methods which are adopted for the removal of excess salts from water. Discuss any one method in details.
d. Draw schematic diagram of Dead end system and Grid Iron system of layout of distribution system. Discuss the advantages and disadvantages of both systems
e. List various types of pipe materials used in water supply and discuss important considerations in respect of choice of materials.

SECTION C

3. Attempt any *one* part of the following: 10 x 1 = 10

(a) A municipal wastewater treatment plant processes an average flow of 5000 m^3/d, with peak flows as 12,500 m^3/d. design a primary clarifier to remove approximately 60% of the suspended solids at average flow.
(b) What do you mean by unit operations and processes? Discuss the types of unit operations and processes.

4. Attempt any *one* part of the following: 10 x 1 = 10

(a) Design a rapid sand filter to treat 10 million litres of raw water per day allowing 0.5% of filtered water for backwashing. Half hour per day is used for backwashing. Take rate of filtration = 5000 l/h/m^2.

(b) Design six slow sand filter beds from the following data:
Population to be served = 5000 persons
Per capita demand = 150 lpcd
Rate of filtration = 180 l/hr/m^2
Length of each bed = twice the breadth
Assume that one unit, out of six, will be kept as stand by.

5. Attempt any *one* part of the following: 10 x 1 = 10

(a) Define ion exchange process. Explain the anion exchange process used for the softening process.

(b) Write the various types of adsorbent used for the treatment of water with respect to dissolved impurity. What are the factors on which the efficiency of adsorbent depends?

6. Attempt any *one* part of the following: 10 x 1 = 10

(a) In two periods each of 20 years, a town population grew from 50,000 to 200000 to 450000. Find the saturation population and expected population in the next 20 years.

(b) Discuss various factors that affect the rate of demand.

7. Attempt any *one* part of the following: 10 x 1 = 10

(a) What do you understand by equivalent pipe? How do you determine its length when the pipes are
   i. in series
   ii. in parallel.

(b) Describe working of reciprocating pumps. What types of the reciprocating pump is used for deep tube well and how will you determine the power requirements of a pumping unit?