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B. TECH
(SEM VI) THEORY EXAMINATION 2022-23
ENVIRONMENTAL 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) What is a spigot and socket joint?
(b) Define reflux and relief valves.
(c) What is coincident draft?
(d) Write Hazen Williams formula with usual notations.
(e) What is Theoretical Oxygen demand?
(f) How will you measure turbidity of river water?
(g) What are various forms of chlorine?
(h) Write various forms of nitrogen present in sewage water.
(i) What is the role of algae in acrobic pond?
(j) Differentiate between attached growth and suspended growth system.

SECTION B

2. Attempt any *three* of the following: **10x3=30**

(a) Discuss various factors that affect the water demand.
(b) Differentiate between storage and service reservoirs. Explain unit operations.
(c) (i) A sample of wastewater has an ultimate BOD of 280 mg/L and a 5-day BOD at 20^0C of 240 mg/L. Calculate 20-day BOD at 20^0C of this sample. (ii)A BOD_5 of waste water is determined to be 150 mg/l at 20°C. The k value is known to be 0.23 per day. What would be the BOD_8 if the test were run at 15°C.
(d) Discuss advantage and disadvantage of soda lime process and ion exchange methods of water softening.
(e) Design a conventional grit chamber unit for a design sewage flow of 120MLD. Assume suitable-data wherever necessary. Draw a schematic diagram of the unit.

SECTION C

3. Attempt any *one* part of the following: **10x1=10**

(a) Over the two periods, each of 20 years population of a town increased from 30000 to 170000 to 300000. Find (i) Saturation population, (ii) Coefficients of logistic equation, and (iii) Expected population in next 20 years.
(b) What are gravity and pressure conduits? Why pressure conduits are most commonly used for conveying water from distant sources to the town for supply?

4. Attempt any *one* part of the following: 10x1=10

(a) What are various methods of layout of distribution system? Explain any two and their advantages.

(b) Write a note on distribution reservoirs. Where are these located? How do you determine the storage capacity of balancing reservoir by mass curve method for 24 hours pumping?

5. Attempt any *one* part of the following: 10x1=10

(a) What is carbonaceous BOD? How the probable interference of Nitrogenous oxygen demand is inhibited during BOD measurement?

(b) Determine the most probable number of coliforms. A standard multiple fermentation test is run on a sample of water from a surface stream. The results of analysis for the confirmed test are shown below:

Size of samples (ml)	No. of positives
10	4
1	2
0.1	1
0.01	0

Table: MPN index for various combination of positive results when 5 test tubes are used per dilution (10ml, 1 ml, 0.1 ml)

Combination of positives	MPN index/100 ml
2-1-0	9
4-2-1	32

6. Attempt any *one* part of the following: 10x1=10

(a) What are the minor and major methods of disinfection? Explain break point chlorination.

(b) Design a plain sedimentation tank for an average flow of water 250m^3/hr. The minimum size of particle to be removed 0.02 mm and expected performance of tank may be taken as 'good'. Kinematic viscosity of water at 20° C = 1.01×10^{-6} m^2/s and specific gravity of particle = 2.65.

7. Attempt any *one* part of the following: 10x1=10

(a) What is sludge digestion? What are two basic types of sludge digestion units? Also name and describe methods of sludge disposal.

(b) Explain the working of UASB reactor.