

III B.Tech. I Semester Regular Examinations, November -2005
ENVIRONMENTAL ENGINEERING-I
 (Civil Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
 All Questions carry equal marks

1. (a) Explain briefly the main objectives of analysis of water used for domestic purposes.
- (b) The following are the results of the Physical and Chemical analysis of a sample of surface water considered as the only available source of supply. Calculate the hardness and alkalinity of water and mention the proposed treatment for this type of water. [8+8]

Chemical Constituent	Concentration mg/lit	Chemical Constituent	Concentration mg/lit
Ca	30	Fe	0.4
Mg	40	Mn	0.3
Na	30	Turbidity	600
K	10	pH	8.5
CO_3	30	F	4.0
HCO_3	70	NO_3	0.1
SO_4	80	-	-

2. (a) Describe the Hardy-Cross method of analysis of pipe networks?
- (b) Describe the graphical method of determining the storage capacities of a reservoir. [8+8]
3. Explain how B.O.D and C.O.D can be determined in the laboratory. [16]
4. What are the principles adopted in providing an efficient and economical system of drainage in buildings. [16]
5. (a) Explain briefly the sedimentation process in a water treatment plant with the help of a neat sketch. [10]
- (b) What are the common types of sedimentation tanks? [6]
6. (a) What are the different factors affecting the bacterial efficiency of chlorine? Explain.
- (b) State the characteristics of Ideal disinfectant. [8+8]
7. Design a screen chamber for the data given below
 Maximum flow- $0.45 m^3/s$
 Average flow- $0.23 m^3/s$
 Minimum flow- $0.084 m^3/s$
 Also draw the plan and section of a swing chamber. [16]

8. (a) What is an oxidation pond? State its advantages and disadvantages.
(b) State the features for the design of oxidation ponds. [8+8]

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2. (a) What are the various steps involved in laying of water pipe line.
- (b) Describe the various layouts of distribution network in a water supply system and state their advantages and disadvantages. [8+8]
3. Explain how B.O.D and C.O.D can be determined in the laboratory. [16]
4. What are the principles adopted in providing an efficient and economical system of drainage in buildings. [16]
5. (a) Design a set of four clari-flocculators to treat 20 MLD of water with a depth of 3m for both. Also check the values of surface and weir loadings. Comment on the values obtained.
- (b) Draw a neat sketch showing the layout of a conventional water treatment plant for a river as the source. [8+8]
6. (a) Explain with the help of sketches the construction of slow sand filters.
- (b) Define effective size and uniformity coefficient of sand and what is their importance in the process of filtration. [8+8]
7. Design a circular sedimentation tank for the treatment of sewage for the treatment of sewage.
Population = 1,00,000

Per capita water supply	= 180 lpcd	
Maximum sewage	= 1.5 times average sewage	
Surface loading rate	= 1.5 cu.m/ m^2 /hour	[16]

8. (a) Design a septic tank for the following data.

No of persons :120

Sewage /capita /day :130litres.

Desludging period:1 year

- (b) Discuss the advantages and disadvantages of a septic tank. [8+8]

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1. (a) Draw an hourly variation curve for demand of water for a typical Indian city and explain its significance.
(b) What are indicator organisms? Discuss the significance of B-Coli test for drinking water. [8+8]
2. (a) A distribution main is tapped at a point where R.L. is 30m and where pressure is 12m head. The service pipe is 60m long and supplies water to 12 occupants at an average rate of 135 LPCD. The hourly variation factor is given as 4. Calculate the size of the supply main if residual head at the top outlet having R.L of 33m is not to fall 1.5m. use the formula $V = 835 m^{2/3} s^{1/2}$
(b) How is the capacity of a distribution reservoir determined? [8+8]
3. Why is the knowledge of storm sewage necessary? How is storm sewage Computed? Describe the factors affecting the quantity of storm sewage. [16]
4. (a) Explain the difference between the dilution process if the waste water effluents are disposed of in a lake or in a sea. [8+8]
(b) Explain clearly the methods, problems and limitation of land disposal of sewa.
5. (a) Explain the main objectives of treatment of water used for domestic purposes.
(b) What is meant by clari-flocculation? [8+8]
6. (a) Explain with neat sketch the details of perforated pipe under drains.
(b) A filter unit of size 4mx8m. After filtering $8500 m^3$ in 24 hour period, the filter is back- washed at the rate of $10 l/m^2/sec$ for 10 minutes. Compute the average filtration rate, quantity and percentage of treated water used in washing and the ate of wash water flow in each trough.
The unit has 4 troughs. [8+8]
7. Explain the construction and working of a trickling filter with a neat sketch. [16]
8. (a) What are the properties and quantity of sludge obtained from various sewage treatment units.
(b) Why is it necessary to treat sewage sludge? What is the process of anaerobic sludge digestion? [8+8]

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1. (a) Compare Surface and Ground waters as source of water supply from the considerations of quantity and quality.
- (b) Following are census figures of population of a city. Estimate the population as on 2001 by using incremental increase method and geometric method. [8+8]

Year	Population
1951	20,000
1961	45,000
1971	80,000
1981	1,20,000

2. (a) A distribution main is tapped at a point where R.L. is 30m and where pressure is 12m head. The service pipe is 60m long and supplies water to 12 occupants at an average rate of 135 LPCD. The hourly variation factor is given as 4. Calculate the size of the supply main if residual head at the top outlet having R.L of 33m is not to fall 1.5m. use the formula $V = 835 m^{2/3} s^{1/2}$
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- (b) Explain clearly the methods, problems and limitation of land disposal of sewa.
5. (a) What are the design considerations for sedimentation tanks?
- (b) Explain with a neat sketch the jar test for the determination of optimum dosage of coagulant for treating water. [8+8]
6. (a) Explain the operational difficulties and the remedies for a rapid sand filter.
- (b) List out the merits and demerits of slow sand filter. [8+8]
7. Design a screen chamber for the data given below [16]
 Maximum flow- $0.45 m^3/s$
 Average flow- $0.23 m^3/s$
 Minimum flow- $0.084 m^3/s$
 Also draw the plan and section of a swing chamber.

8. (a) Define sludge volume index . What is its significance?
- (b) Write short note on
- i. Measurement of sludge volume index.
 - ii. Unsuitability of activated sludge unit for a very small town. [8+8]

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