

II B. Tech II Semester Regular Examinations, June/July - 2022

ENVIRONMENTAL ENGINEERING

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

Answer any **FIVE** Questions each Question from each unit
All Questions carry **Equal** Marks

UNIT-I

- 1 a) What are the Importance and Necessity of Protected Water Supply systems. [7M]
b) Explain the significance of indicator organisms like E.coli in bacteriological analysis of water? List various methods of enumerating them. [7M]

Or

- 2 a) How the water consumed by the customers measured? Describe any suitable device for the same. Discuss on the policy of metering the water supply systems? [7M]
b) Write an account on the common water-borne diseases? [7M]

UNIT-II

- 3 a) Design five slow sand filter beds from the following data for the water works of a town population 125,000, per capita demand = 135 liters/per/ capita. [7M]
Rate of filtration = 250 litres/ hour/m².
Assume maximum demand as 1.5 times the average demand. Out of five units, one is to be kept standby and used while repairing other units.
b) Write about (i) Bar Screens (ii) Grit Chamber(iii) Skimming Tank (iv) Primary Sedimentation Tank [7M]

Or

- 4 a) Explain pressure filter with a neat sketch and mention its advantages and disadvantages. [7M]
b) Write short notes on Dual media filters. [7M]

UNIT-III

- 5 a) Explain about dead end system with neat sketch. What are the advantages and disadvantages of dead end system? [7M]
b) What is a distribution system? What are general requirements that are to be satisfied by the distribution system? [7M]

Or

- 6 a) Discuss about laying and testing of pipe lines. [7M]
b) What do you understand by an equivalent pipe? How do you determine its length when the pipes are (i) in series (ii) in parallel? [7M]



UNIT-IV

- 7 a) Write about the Layouts of Distribution networks, [7M]
b) What are the various on which the design of distribution system depend? [7M]

Or

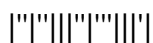
- 8 a) Write the design of drainage in Gated communities. [7M]
b) Write the working principle of Septic tank.. [7M]

UNIT-V

- 9 a) What is sewage sickness? [7M]
b) What are the methods of disposal of sewage into sea and land? [7M]

Or

- 10 a) Explain the term concentration and its significance in design of storm sewers. [7M]
b) Differentiate between separate and combined systems of sewerage suitable to a town. List their merits and demerits? [7M]



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**UNIT-I**

- 1 a) The population of the past three successive decades of a city is given below. [7M]  
Estimate the population of the city for the year 2021 by decreasing rate of growth method.  
Census year Population  
1981 47050  
1991 54500  
2001 61000
- b) Discuss the factors affecting water demand. [7M]

**Or**

- 2 a) Explain about aquifers and list out their relative merits and demerits. [7M]
- b) What are the WHO guidelines for drinking water - IS 10500 2012 . [7M]

**UNIT-II**

- 3 a) Compare and contrast between slow sand filter and rapid gravity filters. [7M]
- b) Explain about the removal of Iron and manganese. [7M]

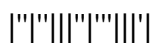
**Or**

- 4 a) Design a rectangular sedimentation tank to supply water for a population of [7M]  
50,000 with an assured average supply of 135 lpcd, detention time of the tank is 4 hours. Assume data needed suitably.
- b) Explain any one water treatment method? [7M]

**UNIT-III**

- 5 a) List out common methods of disinfection usually employed in water treatment. [7M]  
Determine the annual requirement of bleaching powder to treat 6MLD of water which requires 0.3ppm of chlorine. The available chlorine in bleaching powder was found to be 25% only.
- b) Enlist various pipe appurtenances in a water distribution network and with neat sketches explain any two of them. [7M]

**Or**



- 6 a) Explain the factors governing the selection of intake structure. [7M]  
b) Explain about ideal water supply system. [7M]

**UNIT-IV**

- 7 a) Explain the design considerations and working principles of septic tank with sketch? [7M]  
b) Explain in detail different types of sanitary fittings. [7M]

**Or**

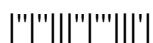
- 8 a) What are the different parameters that are considered in the sewer design? [7M]  
b) Explain the classification of traps. [7M]

**UNIT-V**

- 9 a) Discuss how the symbiotic relationship between algae and bacteria is useful in the treatment of sewage in an oxidation pond. [7M]  
b) i. Explain BOD and derive the expression for it. [7M]  
ii. Explain COD and derive the expression for it.

**Or**

- 10 a) Write short notes on the various materials used in sewer construction. [7M]  
b) Design and sketch an oxidation pond of population 30,000 in a tropical country like India, assuming necessary data. Determine detention time also. [7M]



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UNIT-I

- 1 a) The population of a locality as obtained from census report is as follows : [7M]
Census year 2011 2001 1991 1981 1971
Population 2,76,000 4,12,000 9,40,000 15,06,000 15,69,000
Estimate the population of the locality in the year 2021 by using Incremental method.
- b) What are the common impurities mostly found in natural water? Explain their effect on the quality of water. [7M]

Or

- 2 a) What is B-coli index? How is it determined? [7M]
- b) Write about water quality standards for agriculture and construction. [7M]

UNIT-II

- 3 a) Differentiate between temporary and permanent hardness. Mention any three methods of softening of water. [7M]
- b) What do you understand by the term „disinfection of water“? What should be the requirements of good disinfectant? [7M]

Or

- 4 a) Write short notes on the following, [7M]
i. Pre-chlorination and double chlorination
ii. Chlorine demand
iii. Chlorine compounds
- b) Design a circular sedimentation tank to treat 1 MLD of domestic waste water treatment plant. Make suitable assumptions. [7M]

UNIT-III

- 5 a) Write about pipe materials and pipe joints. [7M]
- b) Write about the pressure and Gravity Conduits [7M]

Or

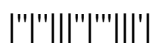
- 6 a) Write the design aspects of pipe lines. [7M]
b) Explain about the check valves and hydrants. [7M]
- 7 a) Explain the different principles that should be considered while designing a house drainage system. [7M]
b) State the factors on which the storm water flow of an area depends. [7M]

Or

- 8 a) What is different method used for the analysis of flow in pipe network. Explain [7M]
i. Hardy-cross method and
ii. Equivalent pipe method
b) What is the foundation of storm water regulator in sewerage systems? Draw a neat sketch of "leaping weir storm regulator. [7M]
- 9 a) Explain the activated sludge process with a flow diagram. [7M]
b) Give advantage and disadvantages of ASP. [7M]

Or

- 10 a) Write down advantages and disadvantages of combined systems of sewage. [7M]
b) Define the terms, [7M]
(i) BOD
(ii) Sullage
(iii) Sewage
(iv) Aerobic Bacteria
(v) Time of Concentration



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**UNIT-I**

- 1 a) With the help of neat sketches, explain Infiltration gallery and Infiltration well? [7M]  
 b) Enlist any four type of pumps usually used in water supply systems and the main factors which are to be considered while selecting a suitable pump. [7M]

**Or**

- 2 a) What are the various factors affecting “per capita demand”? [7M]  
 b) Explain Logistic curve method of population forecasting. [7M]

**UNIT-II**

- 3 a) Explain the theory of sedimentation. [7M]  
 b) Design a rapid sand filter for a total demand of 6 MLD of water with all its principal components. [7M]

**Or**

- 4 a) Explain the various methods of disinfection of water. [7M]  
 b) Explain breakpoint chlorination and super chlorination. [7M]

**UNIT-III**

- 5 a) What are the types of pipes and pipe materials? Explain them neatly. [7M]  
 b) Write about the Design aspects of pipe lines. [7M]

**Or**

- 6 a) Write briefly about the Capacity of storage Reservoirs. [7M]  
 b) Write briefly about the mass curve analysis. [7M]

**UNIT-IV**

- 7 a) With neat sketch, explain about septic tank. [7M]  
 b) Design a septic tank for a small colony of 200 persons with daily sewage flow of 120lpcd. [7M]

**Or**

- 8 a) What is sewage? Explain about the estimation of sewage flow? [7M]  
 b) Discuss about sewer appurtenances. [7M]

**UNIT-V**

- 9 a) Write about the characteristics of Sewage? [7M]  
 b) Explain about Trickling Filter with neat sketch? [7M]

**Or**

- 10 a) Discuss the appurtenances in sewerage. [7M]  
 b) Write about different types of pumps and factors to be considered in the selection of pumps for sewerage. [7M]