CBCS SCHEME

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21CV43

Fourth Semester B.E. Degree Examination, June/July 2023
Public Health Engineering

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Briefly explain various type of water demand. **(10 Marks)**
b. Explain the factor affecting the design period. **(05 Marks)**
c. Explain the method of sampling of water. **(05 Marks)**

OR

2 a. Discuss the importance of physical, chemical and biological characteristics of water. **(08 Marks)**
b. Explain Titrimetric method of determining Alkalinity of given water ample. **(08 Marks)**
c. Discuss the factor effecting the rate of water demand. **(04 Marks)**

Module-2

3 a. Draw a flow chart of conventional water treatment plant and indicate various units. **(05 Marks)**
b. Design a rectangular sedimentation tank to treat 2.4 million liters of raw water per day. The detention period may be assumed to be 3 hours. **(05 Marks)**
c. Briefly explain theory of filtration. **(05 Marks)**
d. Explain the limitation of aeration process. **(05 Marks)**

OR

4 a. Design six sand filter beds from the following data :
Population to be served = 50,000
Persons per capita demand = 150 liters/head/day
Rate of filtration = 180 liters/hr/SQ.M
Length of each Bed = twice the breadth.
Assume Max. Demand as 1.8 times the average daily demand.Also assume that one unit, out of six, will be kept as stand by. **(08 Marks)**
b. Briefly explain, how you will determine the optimum coagulant quantity by jar test. **(08 Marks)**
c. Briefly explain theory of sedimentation. **(04 Marks)**

Module-3

5 a. With the help of chemical formula explain Zeolite process of removing hardness. **(05 Marks)**
b. Explain break point chlorination. **(05 Marks)**
c. Briefly explain types of sewerage system. **(05 Marks)**
d. The 5 day 30°C BOD of sewage sample is 110MG/L. Calculate its 5 days 20°C BOD. Assume the deoxgenation constant at 20°C, K_{20} AS 0.1. **(05 Marks)**

OR

6 a. Explain theory of chlorination of water with chemical equation. **(05 Marks)**

b. With the help of chemical formula explain Lime-SODA process of removing hardness. **(05 Marks)**

c. A city discharges 1500 liters per second of sewage into a stream whose minimum rate of flow is 6000 liters per second. The temperature of sewage as well as water is 20°C. The 5 day BOD AT 20°C for sewage is 200MG/L and that of river water is 1MG/L. The D.O. content of sewage is 2 ERO and that of stream is 90% of the saturation D.O. If the minimum D.O to be maintained in the stream is 4.5MG/L. Find out the degree of sewage treatment required. Assume the de-oxgenation coefficient as 0.1 and de-oxygenation coefficients as 0.3. [Assume saturation D.O AT 20°C is 9.17 mg/ℓ]. **(10 Marks)**

Module-4

7 a. With neat flow diagram, explain unit operation and process of municipal waste water treatment. **(06 Marks)**

b. Discuss briefly with neat sketch grit chamber and oil and grease removal tank. **(08 Marks)**

c. With a neat diagram, explain activated sludge process. **(06 Marks)**

OR

8 a. With a neat sketch explain the working of Manhole and CATCH basin. **(10 Marks)**

b. Explain the importance of screens and types of screens in the sewage treatment process. **(10 Marks)**

Module-5

9 a. With a neat sketch explain construction and operation of trickling filters. **(08 Marks)**

b. With a neat sketch explain oxidation pond. **(07 Marks)**

c. Briefly explain stages in the sludge digestion process. **(05 Marks)**

OR

10 a. Design suitable dimensions of a circular trickling filter units for treating 5 million liters of sewage per day. The BOD of the sewage is 150 MG/L. **(08 Marks)**

b. Briefly explain factors affecting sludge digestion and their control. **(08 Marks)**

c. Explain the advantages of two stage digestion. **(04 Marks)**

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