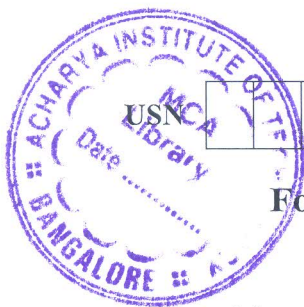# CBCS SCHEME

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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