10CV71

Seventh Semester B.E. Degree Examination, Aug./Sept.2020
Environmental Engineering - II

Time: 3 hrs.   Max. Marks:100

Note:1. *Answer any FIVE full questions, selecting atleast TWO questions from each part.*
    2. *Assume suitable missing data if any.*

PART - A

1   a. Describe the necessity of sanitation of a community. **(05 Marks)**
     b. Explain the different types of sewerage system and mention the advantages and disadvantages of each. **(08 Marks)**
     c. Examine the size of a combined sewer of a circular section required, with the following data
       i)   Area to be served is = 100 hectares.
       ii)   Population = 1,00,000.
       iii) Rate of water supply = 135 liters/day/head.
       iv) Time of entry = 3 min.
       v)   Time of flow = 15 min.
       vi) Impermeability factor = 0.5.
       vii) Max. Velocity permissible = 2m/sec. **(07 Marks)**

2   a. Illustrate what is meant by self cleansing and Non – scouring velocity. Explain with suitable equations. **(08 Marks)**
     b. Write the expression for hydraulic elements of circular sewer when running full and partially full with neat sketch. **(06 Marks)**
     c. Predict the diameter and discharge of a circular sewer laid at a slope of 1 in 450. When it is running half full and with a velocity of 1.8m/sec , N = 0.012. **(06 Marks)**

3   a. List the sewer appurtenances. Explain with a neat sketch, construction and working of a manhole. **(10 Marks)**
     b. Explain the following with sketches :
       i)   Catch basins   ii) Flushing devices. **(10 Marks)**

4   a. Outline the terms BOD and COD and their Importance in waste water treatment. **(08 Marks)**
     b. With neat sketch, explain Nitrogen cycle. **(06 Marks)**
     c. Data from an unseeded domestic wastewater BOD test are, 5mℓ of waste in 300 mℓ bottle. Initial D.O of 7.8 mg/ℓ and 5 days D.O equal to 4.3 mg/ℓ. Compute
       i) The B.O.D   ii) The ultimate BOD. Assuming ak – rate of 0.10/day. **(06 Marks)**

PART - B

5   a. Discuss oxygen sag cure with Strecter – Phelps equation and neat sketch. **(10 Marks)**
     b. Estimate when and where the critical D.O deficit will occur in the downstream portion of river. A city discharges 100 cumecs of sewage into river, which is fully saturated with oxygen and flowing at the rate of 1500 cumecs during its lean days with a velocity of 0.1m/sec. The 5 day BOD of sewage at 20^0C is 280 mg/ℓ. Also find the value of critical D.O. deficit. Assume self purification constant of river as 4.0 , Coefficient of de – oxygenation as 0.1 per day at 20^0C and saturation DO = 9.2 mg/ℓ. **(10 Marks)**

6 a. Write a flow diagram employed for conventional waste water treatment plant. Indicate the importance of each unit indicated in flow diagram. **(08 Marks)**
   b. Explain process of sedimentation. List the design considerations of the sedimentation tank. **(06 Marks)**
   c. Design a set of two circular sedimentation tanks to treat 5 million litre of sewage per day. Assume depth of 2.5m. Check for hydraulic and weir loading. **(06 Marks)**

7 a. What is meant by activated sludge? Describe with neat sketches the treatment of sewage by activated sludge process. **(10 Marks)**
   b. Explain Process of purification of sewage by trickling filters. **(04 Marks)**
   c. Discuss the effects of recirculation on trickling filters, with sketches. **(06 Marks)**

8 a. With a neat sketch, explain the construction details of sludge digestion tank. Explain the different stages involved in sludge digestion process in a digestor. **(10 Marks)**
   b. With a neat sketch, write a explanatory note on :
   i) Oxidation pond   ii) Oxidation ditch. **(10 Marks)**

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