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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 $k = 0.10$ /day. (06 Marks)

PART - B

- 5 a. Discuss oxygen sag curve with Streeter – 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°C 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°C 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 digester. (10 Marks)
- b. With a neat sketch, write a explanatory note on :
- i) Oxidation pond ii) Oxidation ditch. (10 Marks)
