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Seventh Semester B.E. Degree Examination, Jan./Feb. 2021
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 any missing data suitably.

PART – A

- 1
 - a. Explain the necessity and importance of sewerage system. (06 Marks)
 - b. Write a note on variations in sewerage flow and its effect on design of sewerage systems. (06 Marks)
 - c. Discuss step by step procedure, how to estimate the combined sewage flow for the design of sewers? (08 Marks)
- 2
 - a. Explain and give a comparison of separate system and combined system of sewerage. (10 Marks)
 - b. A town of population 50,000 is supplied with water @ 135 ℓ pcd, of which 80% turns out as sewage. Design a sewer section to carry peak flow of 2.5 times the average dry weather flow, when the sewer is running full. The sewer shall be laid at a gradient of 1 in 600 Manning's, $N = 0.013$. (10 Marks)
- 3
 - a. List out the various sewer appurtenances and with the help of neat sketch, explain any two of them. (10 Marks)
 - b. Narrate the procedure for laying, jointing and testing of sewers in the field. (10 Marks)
- 4
 - a. Define the term BOD. Derive an expression for BOD. (06 Marks)
 - b. Discuss briefly the various characteristics of waste water. (06 Marks)
 - c. If 2.5 ml of raw sewage is mixed in a 300 ml of aerated dilution water whose D.O. concentration on the zero day is 8mg/ ℓ . After 5 – days incubation period at 20⁰C, determine the BOD of the raw sewage, if the D.O. of the raw sewage was 0.5mg/ ℓ and the D.O. of the incubated sample is 4mg/ ℓ . Also determine the ultimate BOD. (08 Marks)

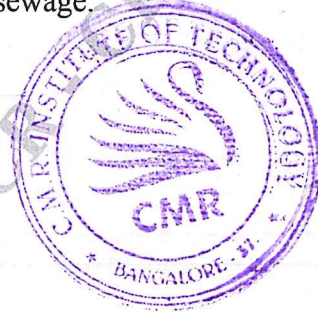
PART – B

- 5
 - a. List the favorable conditions for disposal of sewage by : (10 Marks)
 - i) Dilution method
 - ii) Land treatment.
 - b. What is Self Purification of Streams? With the help of neat figure, briefly explain the salient features related to self purification of streams. (10 Marks)
- 6
 - a. Draw a neat flow diagram required for a sewage treatment system and explain the process employed and treatment achieved in various units (BOD reduction). (10 Marks)
 - b. Design a set of three primary settling tanks for a town of population 2 lakhs and per capita sewage production is 120 (litre per day). Assume a detention time of 2 hours and maximum liquid depth as 3m. Also check for the overflow rate and weir loading rate. Sketch the design. (10 Marks)

- 7 a. List out the common biological treatment processes used. Briefly discuss the main feature of the process involved in each process. (10 Marks)
- b. Design a set of three activated sludge units to treat 10 MLD of sewage with the following data :
- i) BOD of the raw sewage = 210 mg/ℓ.
 - ii) Suspended solids in raw sewage = 300mg/ℓ.
 - iii) BOD removal in primary sedimentation tanks = 30%.
 - iv) Overall BOD removal efficiency desired = 90%.
 - v) Rate of return sludge = 20%.
- Also calculate the total air requirement to treat the sewage. (10 Marks)

- 8 Explain briefly any four of the following :

- a. Self cleansing and non scouring velocities.
- b. Sewage sampling and their types.
- c. Low cost waste water treat methods.
- d. Septic Tank concept.
- e. Infiltration and Ex – Filtration.
- f. Nitrogen cycle.



(20 Marks)
