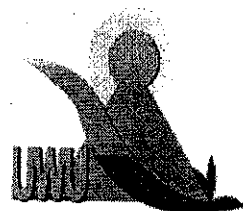




Uva Wellassa University, Sri Lanka
End Semester Examination – March 2011

MRT 323-1 Pollutant Transport in Water



Time: One (01) hour

Total four (04) Questions

Answer all questions

- 01) i. Using contaminant loading history graphs, describe the characteristics of different water contamination sources. Give examples for each. (10 marks)
- ii. Discuss three (03) types of water contaminants with special emphasis on their chemistry, sources, and related health hazards. (15 marks)
- 02) i. Explain the mixing processes taking place in estuaries. (05 marks)
- ii. Describe a calculation method that can be used to estimate the average flow velocity of a stream in the absence of measuring equipment. (10 marks)
- iii. A river flowing at the velocity of 1.5 m/s carries a uniformly distributed suspended chemical load having a concentration of 2.5 kg/m^3 . If the cross sectional area of the river is 60 m^2 , calculate the total flux of the chemical. (10 marks)
- 03) i. Give a qualitatively description of the hydraulic conductivity of earth materials based on their texture. Explain it in relation to Darcy's law. (10 marks)
- ii. Distinguish between turbulent diffusion, molecular diffusion and dispersion of chemicals in water. Illustrate with examples. (15 marks)
- 04) A chemical is continuously added to a river through an effluent discharge channel of a factory located on its right bank. The width of the river is 30 m and it flows at average velocity of 0.12 m/s. The transverse dispersion coefficient of the river has been estimated as $0.01 \text{ m}^2/\text{s}$. Calculate the length of the transverse mixing zone of the chemical (i.e. the length it travels to reach the opposite bank). Assume that the river has a nearly straight longitudinal section. (25 marks)

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(10 mark)

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Part B

1.
 - a. Describe how velocity shear in a river leads to mixing of dissolved chemical mass. Illustrate your answer with diagrams.
 - b. Explain the characteristics of the "Transverse Mixing Zone" of a chemical released into a river from its bank. How can you estimate its length across the river?
 - c. Discuss mixing processes occurring in lakes.
 - d. Write a short note on the role of particles in surface waters in transporting pollutants.

(60 mark)

