EVE 290 Introduction to Environmental Engineering

HW #7

4.10

An industrial WWTP discharges into a large river 0.5 m³/s of industrial wastewater containing an ultimate BOD concentration of 220 mg/L at a temperature of 26 °C and a DO concentration of 2.0 mg/L. The velocity of the river is 0.85 m/s. Upstream of the discharge point, the river has a temperature of 12 °C, an ultimate BOD of 15 mg/L, and a flow rate of 2.5 m³/s. The deoxygenation and reaeration coefficients are 0.2 day⁻¹ and 0.4 day⁻¹, respectively, at 20 °C.

- (a) Calculate the dissolved oxygen concentration [mg/L] at the discharge point.
- (b) Calculate the dissolved oxygen deficit (D_o) in mg/L at the discharge point.
- (c) Calculate the ultimate BOD (L_0) in mg/L at the discharge point.
- (d) Calculate the dissolved oxygen deficit [mg/L] 50 km downstream, assuming that the temperature of the river remains the same as at the discharge point.
- (e) Calculate the dissolved oxygen concentration [mg/L] 50 km downstream, assuming that the temperature of the river remains the same as at the discharge point.