Quiz 5 (50 mins)

Quiz Rules

1. You are expected to abide by highest standards of academic honesty. You have been apprised of it during the first lecture.
2. State the assumptions made very clearly.
3. You are allowed to carry calculator and pen.
4. *Above all, read the question carefully.*

1. [60 points] Company XXX is refurbishing an old stirred tank reactor. It is given that the stirred tank reactor is operated at 80 °C. The reaction kinetics is zero order and the rate constant at 80 °C is 1 mol/L-min in liquid phase. A previous engineer has developed a residence time distribution model for the reactor as:

$$E(t) = \frac{\exp\left(\frac{-t}{100min}\right)}{75min} \tag{1}$$

   Given the inlet concentration into the reactor is 75 mol/L. Calculate the conversion of the reactant in this reactor.

2. [40 points] You are given the following system of CSTRs for which you are required to find the residence time distribution of the effluent concentration of tracer, A. An impulse input of tracer A is injected at $t = 0$.