AOM 3734: Irrigation Principles and Practices in Florida

Assignment #4

Part 1: Understanding Irrigation Efficiencies.

1. Calculate the overall efficiency of a seepage system that pumps from the Floridan aquifer ($E_s = 1.00$), conveys water in an open channel ($E_c = 0.65$) and irrigates potatoes and cabbage ($E_a = 0.55$).
   Calculate the effective efficiency if the recovered fraction of water is 50%.

2. Calculate the water use efficiency for the following data:

<table>
<thead>
<tr>
<th>Application Volume (Acre-in)</th>
<th>Yield (bu)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>23</td>
</tr>
<tr>
<td>1</td>
<td>31</td>
</tr>
<tr>
<td>2</td>
<td>40</td>
</tr>
<tr>
<td>3</td>
<td>43</td>
</tr>
</tbody>
</table>

Part 2: Understanding Chemigation.

3. How much 16-8-8 fertilizer do you have to apply to provide 40 lbs of K. How much is necessary to provide 30 lbs of P?

4. What should be the flow rate of an injector in gpm to maintain the chlorine concentration of 50 ppm knowing that the irrigation flow rate is 550 gpm and the source of chlorine contains 5% of chlorine (NaOCl) and has a specific weight of 9.1 lbs/gal?

5. If the required flow rate of the chemical injection is 0.2 gpm and the time of injection is 1 hr and 20 min, what size of feeder tank is required?


6. Calculate a leaching requirement for ryegrass during extended dry weather period in Florida (assume that all the water requirement is supplied through sprinkler irrigation) knowing:
   the amount of water which must be applied to fulfill crop water requirement ($CR$) is 2 inches per irrigation event, and the irrigation water conductivity is 4.0 dS/m.

7. Calculate a leaching requirement for ryegrass during extended dry weather period in Florida (assume that all the water requirement is supplied through sprinkler irrigation) knowing:
   the amount of water which must be applied to fulfill crop water requirement ($CR$) is 2 inches per irrigation event, and the irrigation water conductivity is 12.0 dS/m.

8. What is the microirrigation leaching factor (based on the max $EC_e$) for sugarcane when the irrigation water conductivity is 4.0 dS/m?
9. What is the microirrigation leaching factor (based on the max $EC_e$) for sugarcane when the irrigation water conductivity is 12.0 dS/m?

Part 4: Understanding Frost Protection.

10. If the minimum temperature is 24°F, and the maximum wind speed is 8 mph, what flow rate per sprinkler would be sufficient when the sprinklers are spaced on a 50 ft by 50ft grid?