CRSS(FORS) 3060 - Soils and Hydrology - Exam 4

Rules: This is a closed book exam, but you can use two pages of notes. Please don’t work with others on this - sit one-seat apart, and don’t copy.

1. Fill in the blanks. (2 points each)

Across
3 Primary source of historic sediments in Georgia streams
5 USLE A variable
6 Primary material in bedload
7 Type of liquid that floats on the water table
9 Disk used to measure water clarity in lakes
11 USLE C factor
12 USLE P factor
14 Measure of water clarity in a river
19 Primary source of water for stormflow
20 Material found floating in the water column
21 Manning’s S factor

Down
1 USLE K factor
2 Type of liquid that sinks to the bottom of an aquifer
4 Contaminant most likely in surface and groundwater
8 USLE Length-Slope factor
10 Primary source of water for baseflow
13 Manning’s n factor
15 Material flowing on the bottom of a stream
16 USLE T factor
17 USLE R factor
18 Primary radioactive carcinogen found in tobacco smoke
2. Rainfall - Runoff. The state climatologist recommends that turf gets irrigated with one inch of water each week if there is no rain. (4 pts ea).

(a) How many acre-feet of water would this be if 240 acres need to be irrigated?

\[ \text{Acre-Feet/week} = \ldots \]

(b) How many gallons is this if an acre is 43,560 ft\(^2\) and there are 7.48 gallons in a cubic feet?

\[ \text{Gallons/week} = \ldots \]

(c) How many people would this supply if each person uses fifty gallons per day?

\[ \text{People} = \ldots \]

(d) A five-acre water hazard (pond) that is six feet deep is used to supply the irrigation water. How many weeks supply of water would this provide?

\[ \text{Weeks} = \ldots \]

(e) No rain fell during the early summer and the pond completely dried up, but then a tropical storm dumped ten inches of rain. Calculate the runoff depth using a Curve Number of 70.

\[ Q \text{ (in)} = \ldots \]

(f) Calculate the volume of runoff for a watershed area of 1000 acres, and indicate whether this is enough to fill the pond.

\[ \text{Volume (AF)} = \ldots \]

3. Erosion. Calculate the soil erosion loss in tons per acre per year for rainfall erosivity = 150, soil erodibility = 0.15, \( LS = 4.5 \), crop factor = 2.5, erosion control factor = 0.6 and tolerance = 4. (2 pts ea)

(a) Total soil erosion yield (tons/ac/yr) =

\[ \ldots \]

(b) Is this an acceptable soil loss?

\[ \ldots \]
4. Streamflow. Complete the following table using data collected in a stream. (6 pts)

<table>
<thead>
<tr>
<th>Interval</th>
<th>(a)</th>
<th>(b)</th>
<th>(c)</th>
<th>(d)</th>
<th>(e)</th>
<th>(f)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width (ft):</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Depth (ft):</td>
<td>0.4</td>
<td>2.9</td>
<td>2.1</td>
<td>2.1</td>
<td>2.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Velocity (ft/s):</td>
<td>0.1</td>
<td>3.1</td>
<td>2.1</td>
<td>1.9</td>
<td>1.3</td>
<td>1.3</td>
</tr>
</tbody>
</table>

(a) What is the total stream area? (Hint: Add up the areas) (3 pts) \( A (\text{ft}^2) = \) 

(b) What is the total streamflow? (Hint: Add up the flows) (3 pts) \( Q (\text{cfs}) = \) 

(c) What is the average velocity? (Hint: \( \bar{v} = Q/A \)) (3 pts) \( \bar{v} (\text{ft/s}) = \)

5. Runoff. On the graph below, sketch two runoff curves, one for a bare soil and a second for a mulched soil, for a storm with a constant precipitation rate. (8 pts)

![Runoff graph](image)

Give three reasons why they are different.

(a) 

(b) 

(c) 

6. Soil contamination. Make a sketch of a leaking landfill with an aquifer flowing to the right underneath it. Show where the LNAPLS, DNAPLS, and APLS are most likely to be. (5 pts)
7. Watershed Delineation: Delineate the Satilla River (southeast Georgia), which is one of the few rivers in the United States that flows into the Atlantic Ocean without a dam. (5 pts)

8. EXTRA CREDIT (5 pts) - Faculty and Teaching Assistant Evaluations - eval.franklin.uga.edu