O GIVEN: A LARGE ORCHARD IS PLANNED FOR INSTALLATION IN THE WATERSHED SHOWN BELOW.

1) A WATERSHED MAP WITH HYDROLOGIC SOIL GROUPS LOCATED
2) A WATERSHED MAP WITH LAND USE CLASSIFICATIONS Labeled
3) TIME OF CONCENTRATION FOR THE WATERSHED - 40 MINUTES
4) RAINFALL RATE - DURATION-FREQUENCY DISTRIBUTION CURVES
5) RETURN PERIOD OF THE STORM IS 25 YEARS

FIND:
1) FIND AREA OF WATERSHED IN ACRES
2) FIND AREA WEIGHTED RUNOFF COEFFICIENT, C
3) WHAT IS THE RAINFALL INTENSITY, I, FOR THIS 25 YR STORM?
4) DETERMINE THE PEAK FLOW RATE (Qp) USING THE RATIONAL METHOD

SOLUTION:

\[ A = 1850 \text{ in}^2 \]
\[ A = 18 \times 10000 \text{ in}^2 = 1.8 \times 10^9 \text{ in}^2 \]
\[ A = 1.8609 \text{ in}^2 \times \frac{1 \text{ ft}^2}{144 \text{ in}^2} \times \frac{1 \text{ ac}}{4856 \text{ ft}^2} = 0.0787 \text{ ac} \]
2) FROM FIGURE 1 (SOIL GROUPS)

<table>
<thead>
<tr>
<th>SOIL TYPE</th>
<th>AREA</th>
<th>LAND USE</th>
<th>AREA</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSG = A</td>
<td>5in²</td>
<td>INDUSTRIAL 7-10%</td>
<td>6in²</td>
</tr>
<tr>
<td>HSG = D</td>
<td>10in²</td>
<td>GRASS/FOREST 6-7%</td>
<td>8in²</td>
</tr>
<tr>
<td>HSG = C</td>
<td>3in²</td>
<td>AGRICULTURAL 0-2%</td>
<td>4in²</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>18in²</td>
<td><strong>TOTAL</strong></td>
<td>18in²</td>
</tr>
</tbody>
</table>

**AREA: (c)**

<table>
<thead>
<tr>
<th>TYPE</th>
<th>INDUSTRIAL 7-10%</th>
<th>GRASS/FOREST 6-7%</th>
<th>AGRICULTURAL 0-2%</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSG A</td>
<td>2in² (0.08)</td>
<td>2.5in² (0.20)</td>
<td>0.5in² (0.14)</td>
</tr>
<tr>
<td>HSG D</td>
<td>2in² (0.08)</td>
<td>4.0in² (0.25)</td>
<td>2.5in² (0.20)</td>
</tr>
<tr>
<td>HSG C</td>
<td>0.5in² (0.02)</td>
<td>1.5in² (0.08)</td>
<td>1.1in² (0.07)</td>
</tr>
</tbody>
</table>

* C VALUE IS FROM TABLE 5.3 IN TEXT

\[
c_{\text{avg}} = \left( \frac{7}{10}(0.08) + \frac{3}{10}(0.08) + 0.9(0.06) + \frac{2.5}{10}(0.20) + 4.0(0.25) + 1.9(0.22) + 0.5(0.14) \\
+ 2.5(0.20) + 1.1(0.20) \right) \\
\]

\[
c_{\text{avg}} = 0.475 
\]

3) FROM FIGURE 2.17

RAINFALL INTENSITY \( C + 40 \text{ min} = 3 \text{ in/hr} \)

4) \( q = 1.00 \text{ cfs} \)

\( q = 1.00 \times (1.25 \times 3) (287) \)

\( q = 412 \text{ cfs} \)

\( q = 1.00 \times (0.495 \times 3) (287) \)

\( q = 409 \text{ cfs} \)