**CE420 SOLUTION 6**

**1.)**

C1, C2, C3 values are taken from Table 11.1 as C1=0.12, C2=0.14, C3=0.11.

The bed slope is S0= 0.0005 so elevation difference, H= 0.0005\*3000= 1.5 m

tc= 0.0195()0.385=173.1 min

Collectors are designed for Tr =25 years of return period. With this information i = 3.7 mm/hr is obtained from Figure 11.1. S=1000\*S0 = 0.5.

Q= 0.0023\*0.37\*3.7\*(0.5)1/5\*(900)4/5= 0.63 m/s

**2.)**

**a-** Hooghoudt’s Equation: Consider b = de +m. Hooghoudt’s equation is used together with Equations (11.7) and (11.8). The solution is presented below:

|  |  |  |  |
| --- | --- | --- | --- |
| Assumed S (m) | D/S | De (m) Eq. (11.7) or (11.8) | S(m) Eq. (11.5) |
| 150.0 | 0.060 | 6.34 | 184.1 |
| 180.0 | 0.050 | 6.68 | 188.0 |
| 188.0 | 0.048 | 6.75 | 188.8 |
| 190.0 | 0.047 | 6.78 | 189.1 |

As can be seen from the table that S≈ 190 m.

**b-** The maximum rooting depth of the corn in the field is 1.2 m. *(According to the textbook)*

Δh= 0.005/0.10= 0.05 m, ht= h0- Δh = 1.80- 0.05= 1.75 m

The Glover-Dumm Equation can be used:

S= π\* =70.9 A trial and error solution is performed.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Assumed S (m) | D/S | C | de (m) | S=70.9 de (m) |
| 180 | 0.05 | 3.48 | 6.68 | 183.2 |
| 185 | 0.049 | 3.48 | 6.71 | 181.8 |

Therefore, S ≈ 183 m.