ASSIGNMENTS and ANSWERS

dcm 2/13/2018

Except as noted, problem numbers refer to Shammas and Wang (2011).

<table>
<thead>
<tr>
<th>week</th>
<th>topic</th>
<th>assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Civil engineering design process.</td>
<td>(see handout)</td>
</tr>
<tr>
<td>2</td>
<td>Introduction to water systems.</td>
<td>(see handout)</td>
</tr>
<tr>
<td>3</td>
<td>Water software (EPANET).</td>
<td>(see handout)</td>
</tr>
<tr>
<td>4</td>
<td>Demand estimation.</td>
<td>(see handout)</td>
</tr>
<tr>
<td>5</td>
<td>Tanks and pumps.</td>
<td>8.6, 8.7, 8.8, 8.9, 8.15</td>
</tr>
<tr>
<td>6</td>
<td>Water hydraulics.</td>
<td>5.3, 5.8</td>
</tr>
<tr>
<td>7</td>
<td>Water system design I.</td>
<td>6.7 (Section E-E), 6.19</td>
</tr>
<tr>
<td>8</td>
<td>Water system design II.</td>
<td>6.4</td>
</tr>
<tr>
<td>9</td>
<td>Review. Midterm exam.</td>
<td>(see handout)</td>
</tr>
<tr>
<td>10</td>
<td>Water system design III.</td>
<td>(see handout)</td>
</tr>
<tr>
<td>11</td>
<td>Groundwater resources.</td>
<td>3.1, 3.4, 3.6</td>
</tr>
<tr>
<td>12</td>
<td>Surface water resources.</td>
<td>(see handout)</td>
</tr>
<tr>
<td>14</td>
<td>Safety culture.</td>
<td>(see handout)</td>
</tr>
</tbody>
</table>

Answers to Problems

*These partial answers will help determine whether you are on track. Some have been rounded.*

**Week 1**
Results will vary.

**Week 2**
Results will vary.

**Week 3**
1. pipe AB, \( Q = 0.67 \text{ MGD} \), head loss \( H = 87 \text{ ft} \)
2. pipe AB, \( Q = 0.28 \text{ MGD} \), head loss \( H = 18 \text{ ft} \)

**Week 4**
1. Answers will vary depending on assumed number of houses, size, and construction.
2. (b) \( L = 738,198 \); (d) \( p = 42.36, q = 0.0392 \); (e) \( y_{2060} = 726,089 \)
**Week 5**

8.6 500 gal/min  
8.7 77 ft  
8.8 8.2 hp  
8.9 2,100 gal/min  
8.15 (a) $\psi = 400 \text{ m}^3$; (b) $\psi = 130 \text{ m}^3$

**Week 6**

5.3 (a) $H_A = 99 \text{ m}$; (b) $Q_C = 1.9 \text{ L/s}$  
5.8 (a) $Q_{BC} = 70 \text{ L/s}$, (b) $P_D = 468 \text{ kPa}$, (c) $z_{max} = 602 \text{ m}$, (d) $D_{AB} = 500 \text{ mm}$

**Week 7**

6.7 Section E-E: deficiency 1.6 MGD, so add/remove pipes, while keeping $S \approx 2\%$  
6.19 Part A, $\Sigma H = +0.30 \text{ ft}$  
  Part B, $P_C = 28 \text{ psi}$  
  Part C, $P_C = 17 \text{ psi}$

**Week 8**

6.4 $D = 350 \text{ mm}$

**Week 9**

(a) Profile A-B-C given in problem statement.  
Profile A-B-D as follows:
(b) Profile A-B-C as follows:

![Profile A-B-C](image1.png)

Profile A-B-D as follows:

![Profile A-B-D](image2.png)
Week 10
Answers will vary.

Week 11
3.1 Answers will vary—consult text for details.
3.4 Coarse sand $v = 0.30 \text{ m/d}$. Clay bed $v = 0.00002 \text{ m/d}$ (15,000 times slower).
3.6 $T = 2.5 \times 10^4 \text{ gpd/ft}$. $S = 1.0 \times 10^{-5}$.

Week 12
1  3,700 ac-ft
2  deposition rate $c$ near the low range
3  at $z = 1456 \text{ ft}$, $V = 588 \text{ ac-ft}$ (+0.5% error)

Week 13
Mays (2005) 13.1.1 $5,302,500$
Mays (2005) 13.1.2 $6,121,500$

Week 14
1. CATME team participation report—answers will vary.
2. Values statement—answers will vary.