

Overtopping

Question 1

$$\text{Slope} = 1:3$$

$$r = 1$$

$$R_c = 4.8 - 2.8 = 2.0 \text{ m}$$

$$H_s = 3.5 \text{ m}$$

$$T_m = 6.8 \text{ s}$$

$$\begin{aligned} R^* &= \frac{R_c}{T_m \sqrt{g H_s}} = \frac{2.0}{6.8 \times \sqrt{9.81 \times 3.5}} \\ &= \frac{2.0}{6.8 \times \sqrt{34.34}} \\ &= \frac{2.0}{6.8 \times 5.86} \\ &= \frac{2.0}{39.85} = \underline{\underline{0.05}} \end{aligned}$$

$$Q^* = A e^{\left(\frac{-BR^*}{r}\right)} \quad \text{From Table } A = 0.0163 \quad B = 31.9$$

$$\begin{aligned} Q^* &= 0.0163 \times e^{\left(\frac{-31.9 \times 0.05}{1}\right)} \\ &= 0.0163 \times e^{(-1.595)} \\ &= 0.0163 \times 0.203 \\ &= 3.31 \times 10^{-3} \end{aligned}$$

$$= \underline{\underline{3.31 \times 10^{-3}}}$$

$$q = Q^* T_m g H_s$$

$$= 3.31 \times 10^{-3} \times 6.8 \times 9.81 \times 3.5$$

$$= 0.772 \text{ m}^3/\text{s}/\text{m} = \underline{\underline{772 \text{ L/s/m}}}$$

Question 2

$$\text{Slope} = 1:4$$

$$r = 1.0$$

$$R_c = 5.0 - 2.6 = 2.4 \text{ m}$$

$$H_s = 4.2 \text{ m}$$

$$T_m = 8.0 \text{ s}$$

$$R^* = \frac{R_c}{T_m \sqrt{g H_s}} = \frac{2.4}{8.0 \times \sqrt{9.81 \times 4.2}}$$

$$= \frac{2.4}{8.0 \times \sqrt{41.20}}$$

$$= \frac{2.4}{8.0 \times 6.42}$$

$$= \frac{2.4}{51.35} = \underline{\underline{0.047}}$$

$$Q^* = A e^{\left(\frac{-BR^x}{r}\right)} \text{ From Table } A = 0.0192 \quad B = 47.0$$

$$Q^* = 0.0192 \times e^{\left(\frac{-47.0 \times 0.047}{1}\right)}$$

$$= 0.0192 \times e^{-2.21}$$

$$= 0.0192 \times 0.110 = \underline{\underline{21.08 \times 10^{-3}}}$$

$$q = Q^* T_m g H_s$$

$$= 21.08 \times 10^{-3} \times 8.0 \times 9.81 \times 4.2$$

$$= 6.948 \text{ m}^3/\text{s}/\text{m} = \underline{\underline{6948 \text{ L}/\text{s}/\text{m}}}$$

Question 3

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$$\text{Slope} = 1:1.5$$

$$r = 1$$

$$R_c = 4.5 - 3.0 = 1.5 \text{ m}$$

$$H_s = 3.8 \text{ m}$$

$$T_m = 7.2 \text{ s}$$

$$\begin{aligned} R^* &= \frac{R_c}{T_m \sqrt{g H_s}} = \frac{1.5}{7.2 \times \sqrt{9.81 \times 3.8}} \\ &= \frac{1.5}{7.2 \times \sqrt{37.28}} \\ &= \frac{1.5}{7.2 \times 6.11} \\ &= \frac{1.5}{43.96} = \underline{\underline{0.034}} \end{aligned}$$

$$Q^* = A e^{\left(\frac{-BR^*}{r}\right)} \quad \text{From table } A = 0.0102 \quad B = 20.1$$

$$= 0.0102 \times e^{\left(\frac{-20.1 \times 0.034}{1}\right)}$$

$$= 0.0102 \times e^{(-0.683)}$$

$$= 0.0102 \times 0.505 = \underline{\underline{5.15 \times 10^{-3}}}$$

$$q = Q^* T_m g H_s$$

$$= 5.15 \times 10^{-3} \times 7.2 \times 9.81 \times 3.8$$

$$= 1.382 \text{ m}^3/\text{s}/\text{m} = \underline{\underline{1382 \text{ L/s}/\text{m}}}$$