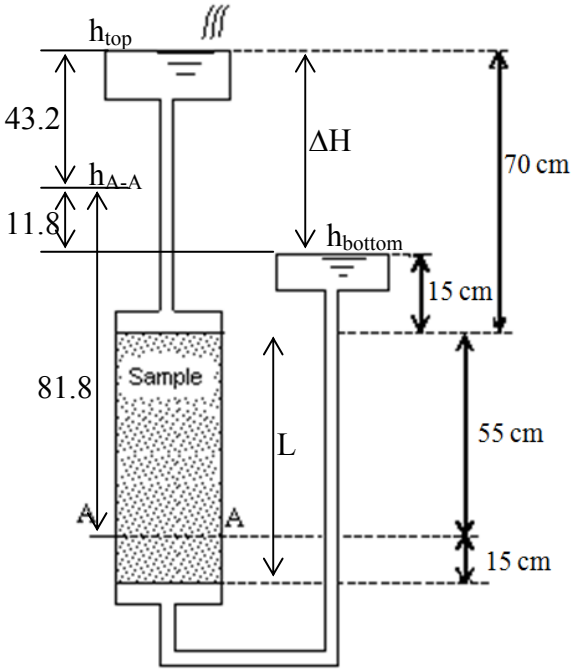


Q1: ***a)***

$$i = \frac{\Delta H}{L} = \frac{55}{70} = 0.786$$

b) $Q = Aki$

$$k = \frac{Q}{Ai} = \frac{5.4}{250 \times 0.786} = 0.0275 cm/s$$

c)

$h_{A-A} = h_{top} - 55i = h_{top} - 43.2$

OR

$h_{A-A} = h_{bottom} + 15i = h_{bottom} + 11.8$

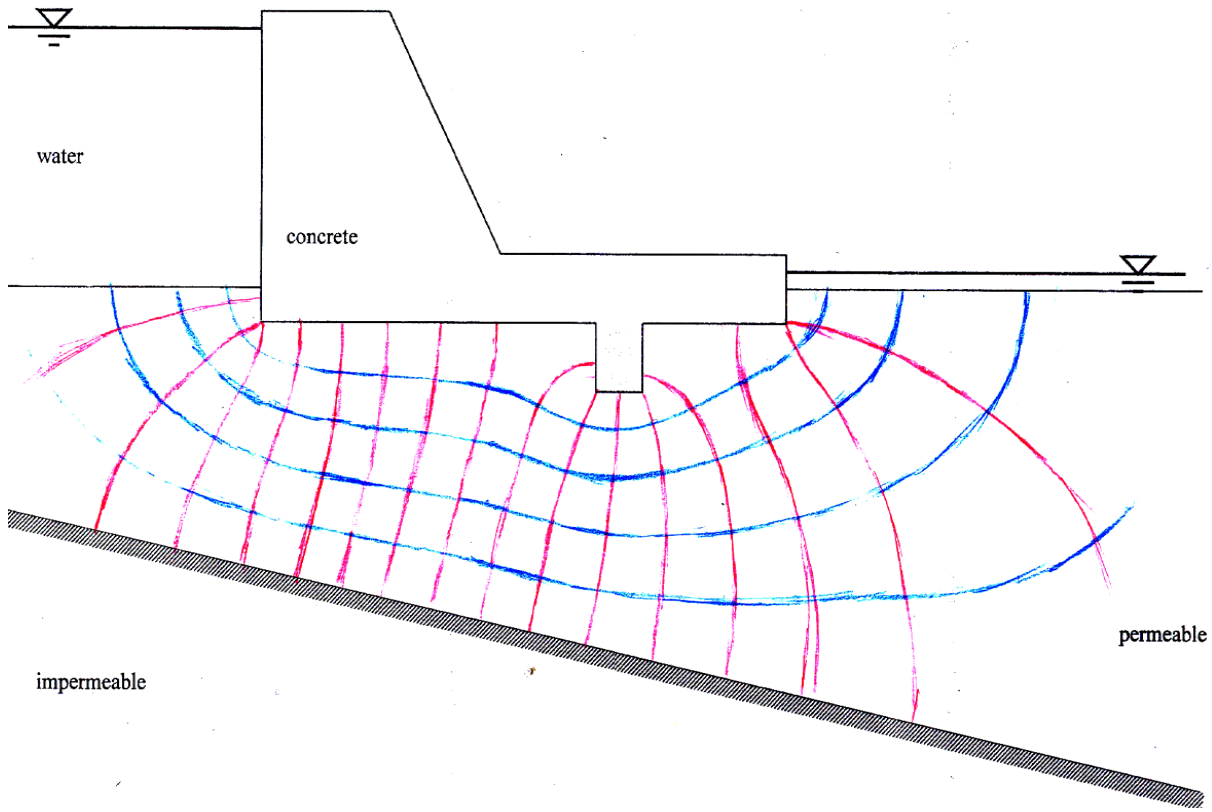
$u_{A-A} / \gamma_w = 81.8cm \Rightarrow u_{A-A} = 8.18kPa$

$\sigma_{A-A} = 0.55 \times 19 + 0.7 \times 10 = 17.45kPa$

$\sigma'_{A-A} = 17.45 - 8.18 = 9.27kPa$

d) Constant head permeability test is more suitable for <u>coarse grained soils</u>

Q2:



Q3:

a. $\Delta h = 13 - 7 = 6$ m

$N_f = 9$, $N_d = 20.3$

$Q = k.\Delta h.N_f/N_d = 4x10^{-7}x6x9/20.3 = 1.06x10^{-6}$ m^3/s (water seepage from one side)

Due to symmetry, the total amount of seepage into the excavation:

$2Q = 2.13x10^{-6}$ m^3/s per m = 7.66 Lt/hr per m

b. The head loss between two energy lines: $\Delta h / N_d = 6/20.3 = 0.296$m

Distance between the energy lines near point A (from scale) $\approx$ 0.4m

$i_A = \Delta h / \Delta L = 0.296/0.4 = 0.74$

c. Total stress: $\sigma_A = 20x1.3 = 26$ kPa

Pore pressure:

$h_A = 13 - 16.8x6/20.3$ OR $h_A = 7 + 3.5x6/20.3 \Rightarrow h_A = 8$m

$z_A = 7.5 - 1.3 = 6.2$ m

$u_A = (h_A - z_A).\gamma_w = (8-6.2).10 = 18$ kPa

Effective stress at point A: $\sigma_A' = \sigma_A - u_A = 26 - 18 = 8$ kPa $> 0 \Rightarrow$ stable