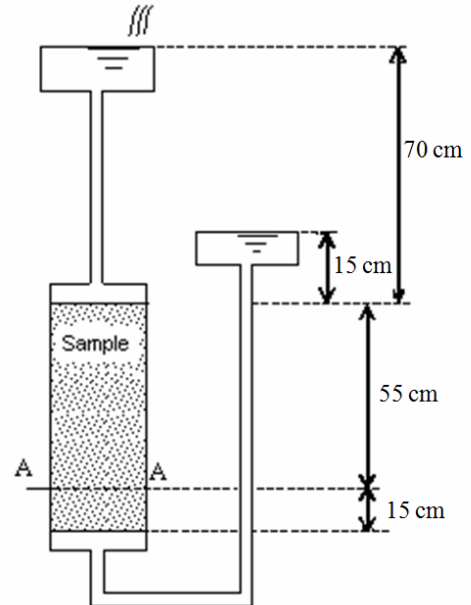


### Soil Mechanics Homework-3

**Q1.** For the illustrated permeability test setup:

- a) Calculate the hydraulic gradient.
- b) Calculate the coefficient of permeability if the cross-sectional area of the soil sample is  $250 \text{ cm}^2$  and the flow rate is  $5.4 \text{ cm}^3/\text{s}$ .
- c) Calculate the vertical effective stress acting on plane A-A if the saturated unit weight of the soil sample is  $19 \text{ kN/m}^3$ .
- d) For which type of soil is this test setup suitable?



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**Q2.** Draw the flow net for the dam section on page 2.

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**Q3.** A part of a lake basin is to be dewatered and excavated (See page 3). The head at the lake basin is 13m and will be lowered to the elevation of 7m inside the section between the sheet-pile walls (new water level is shown as a pink line in the figure). Then the excavation is made to 7.5m height. The base soil has a permeability of  $k=4 \times 10^{-7} \text{ m/s}$  and a unit weight of  $\gamma = 20 \text{ kN/m}^3$ . (The flow lines are shown only on half of the section, as the section is symmetric)

- a) Calculate the amount of water that should be pumped out of the excavation pit, per unit length (into the page) of excavation, per hour.
- b) Point A is 1.3m below the excavation bottom. Calculate the hydraulic gradient at A.
- c) Check for boiling at point A.

