

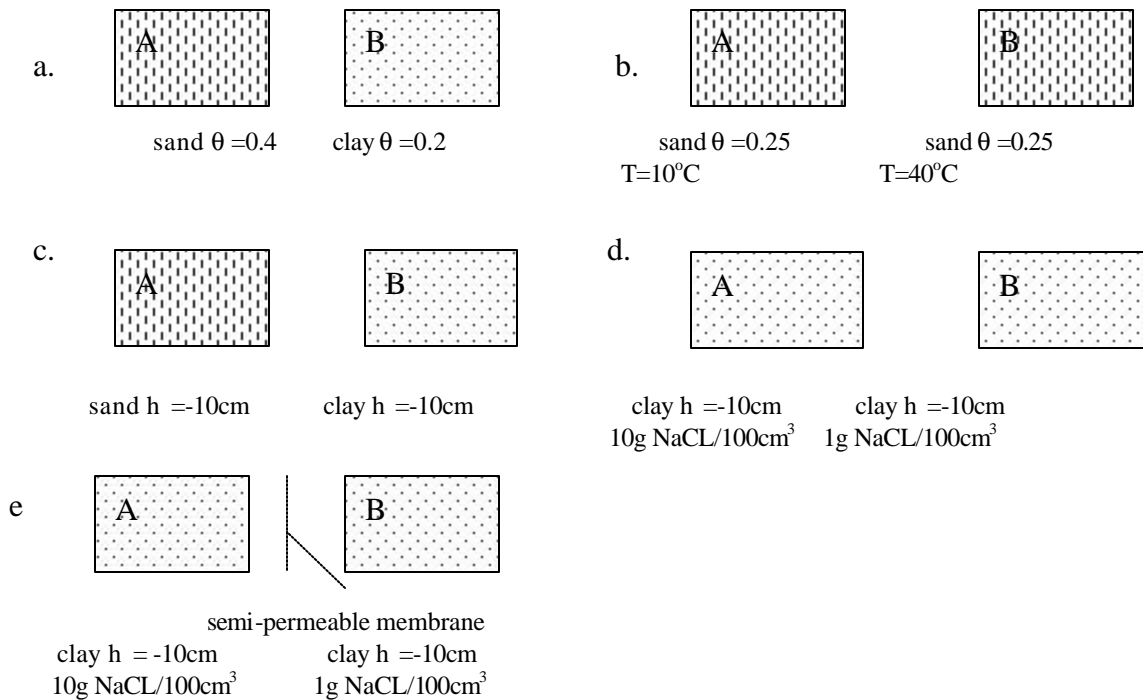
SSC 107

Problem set 3

Date: Oct. 18, 2002

Due: October 25, 2002

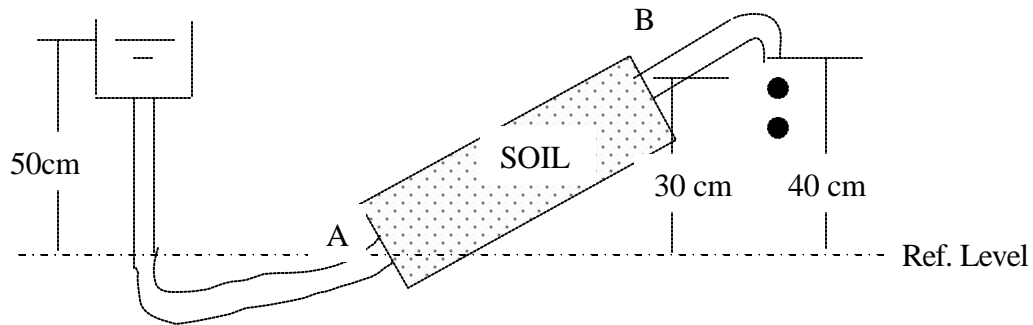
1. In which direction will water flow from A to B, B to A or no flow, if the following pieces of soil are placed in contact with each other? Why?



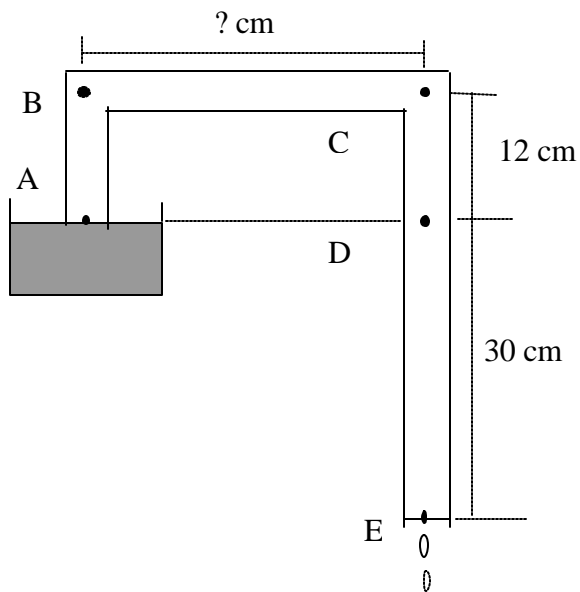
2. (a). A 50-cm long soil column containing packed sand with a saturated hydraulic conductivity of 80 cm/day is placed vertically with the bottom open to the atmosphere. A constant 10-cm of water is ponded continuously on the top surface. Calculate the steady state flux density through the soil. And how much water will drain from the soil column during 5 hours, if the cross sectional area of the column is 10 cm².

(b). Assume that the same soil column is placed horizontally, with 10 cm of water ponded on the left side while the right side is open to the atmosphere. Calculate the flux through the soil column.

3. A soil column is assembled in the lab as shown below. Find the matric head (h), gravitational head (z), and total head (H) at each end (A and B) of this column.



4. A uniform soil column is in contact with a free water surface as shown in the figure below. The water level is maintained at level A. Flow is at steady state with water dripping from point E. A tensiometer at point C indicates a soil water matric head of -30 cm. Assume a uniform water content and constant saturated hydraulic conductivity throughout the column. (a) Find the total hydraulic head, H , at all points along the column and (b) calculate the distance between points B and C.



5. A layered vertical soil column consists of 60 cm of soil 1, on top of 20 cm of soil 2. The saturated hydraulic conductivity of soil 1 is 6 times the saturated hydraulic conductivity of soil 2. The soil surface has water ponded to a constant height of 10 cm. There is steady state water flow. Calculate the matric head, gravitational head, and total head at points A, B, and C (See Figure).

Also, plot the matric, gravitational and total head as a function of column depth.

Given that the saturated hydraulic conductivity of the soil 2 is 1.2 cm/day, compute the steady state flux through the column?

Repeat calculations, if 60-cm soil 1 is below the 20-cm soil 2.

