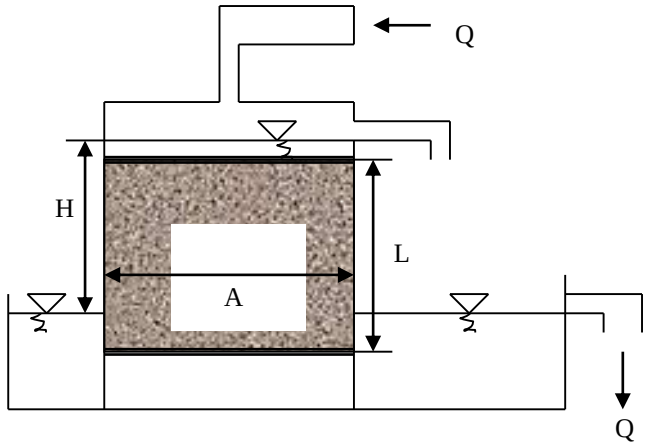
CIVIL ENGINEERING FACULTY HYDRAULICS DIVISION
HYDROLOGY

Examples –5 Groundwater Flow

1.) A soil sample with a length of 25 cm and a cross sectional area of 80 cm^2 is placed in a H = 10 mm constant headed permeameter. The Q discharge passing through this sample is measured to be 0.16 cm^3/s. Calculate the hydraulic conductivity of the soil.



2.) The distance between two observation wells over a free surface aquifer is 70 m. The static level of well A is 75 m and well B is 74.4 m, respectively. It takes for a radiactive tracer which is released from well A 3 hours and 40 minutes to reach well B. The porosity of a soil sample is 13 % and depth of aquifer is 30 m.

Note: Water temperature is assumed to be 10 ^0C and dynamic viscosity of water at this temperature is $134x10^{-6}$.

a) Find the slope of the groundwater in the aquifer. Which direction does it flow?
b) Calculate the actual and fitler velocity of the groundwater.
c) Calculate the hydraulic conductivity of the aquifer.
d) Calculate the conduction capacity of the aquifer.
e) What is the specific permeability constant (coefficient) of the soil?

3.) 0.03 m^3/s of a discharge is extracted from a free surface aquifer of 40 m depth via a pumping well of a 40 cm diameter. The level decrease of two observation wells with distances 20 and 50 m from the pumping well are 3.2 m and 1.9 m, respectively.

a) Calculate the hydraulic conductivity and the conduction capacity of the soil.
b) What is the level decrease at the pumping well?

4.) Water is coming with a discharge of $0.07m^3/s$ from a well which was drilled through a horizontal bottomed pressurized aquifer (artesian well) with an 8 m thickness. The water level readings at the two observations wells which are 55 m and 115 m far from this well are 12.6 and 14 m, respectively. Calculate the hydraulic conductivity of this aquifer.