URBAN INFASTRUCTURE HYDRAULIC SYSTEMS

GROUNWATER AND WELL HYDRAULICS

RECITATION-1

Question 1: A well in a homogeneous unconfined aquifer as shown in the Figure;

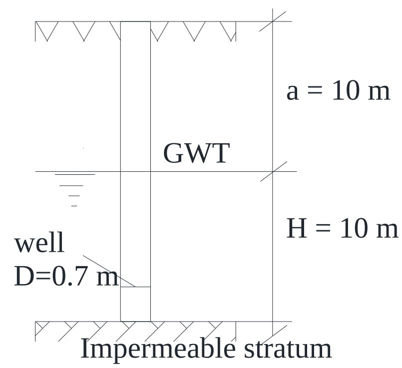
a) Determine the optimum discharge.

b) Find the number of wells.

c) Draw schematic view of the well and show the locations of engine and pump on the Figure.

d) Determine the optimum discharge and drawdown with graphical solution.

(Q_{demand}=25 lt/sec, permeability coefficient, k==0.003 m/sec, $V_{max}=\frac{\sqrt{k}}{15}$, $R = 3000s\sqrt{k}$)



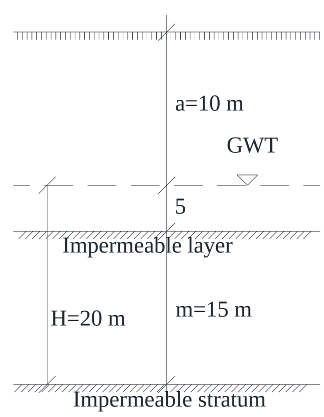
Question 2: A city with future population of 20000 water demand will be supplied from confined aquifer as shown in the Figure. The results of sieve analysis of soil are given in Table.

a) Determine discharge of demand (Q_{demand}). (meanq_{day}=100 lt/*ind.*/day).

b) Evaluate the coefficient of the hydraulic conductivity of the soil (k).

c) Determine the optimum diameter of well and number of wells.(Try D_1=60cm, D_1=80cm, D_1=90 cm), ($V_{max}=\frac{\sqrt{k}}{30}$).

Sieve Size (mm)	Percent Fine%
< 0.2	10
0.2-0.6	50
0.6-2.0	30
>2.0	10
	100



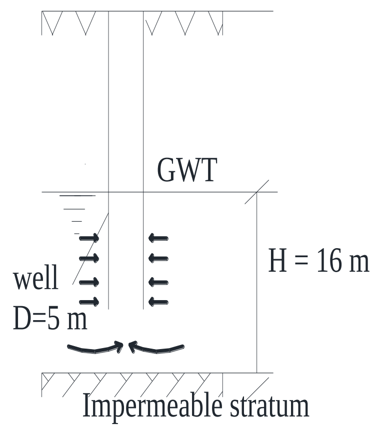
Question 3) In a city population in 1950 is 10000 and population in 1970 is 20000. A Population of a touristic facility will be build to close the city is 10000. Water demand of city and touristic facilty will be supplied from spring with Q_{min}=10 lt/sec and infiltration drains. (max$q_{day,city}$= 150 lt/*ind.*/day , max$q_{day,facility}$ = 200 lt/*ind.*/day and k= 0.0004 m/sec)

a) Determine the population of city in 2010 according to ILBANK.

b) Evaluate the total water demad of city with touristic facilty.

c) Design the horizontal infiltration drains. (ϕ100, ϕ200, ϕ300, ϕ400, ϕ600, ϕ900, ϕ1200)

Question 4) Water demand of a city for estimated future population is 20000 will be supplied from caisson well as seen in Figure. Caisson well is supplied from sides and bottom of the well. (mean$q$day= 100 lt/ind./day , $\alpha = 0.25$ and k= 0.0004 m/sec, $Q_{\max} = (\alpha \pi d h \frac{\sqrt{k}}{15} + \frac{\pi d^2}{4}\frac{\sqrt{k}}{15})$, $R = 3000 s\sqrt{k}$)



a) Determine the water demand of city, Q_{demand} .

b) Find the number of wells, discharges and drawdown for each well.