



Hydrogeology Home work Set 4 # Pumping Test

Date: **Wednesday, 17 Ordibehesht 1393** Due Date: **Wednesday, 31 Ordibehesht, 1393**

1. The well is located in an aquifer with a conductivity of 15 meters per day and a storativity of 0.005 .The aquifer is 20 meters thick and is pumped at the rate of 2725 cubic meter per day. What is the draw down at the distance of 7 meter from the well after one day of pumping?
(Use This solution for this question)
2. A well in a confined aquifer was pumped at a rate of 220 gallons per minute for about 8 hours. The aquifer was 18 feet thick .Time- draw down data for an observational well 824 feet away are given in the following table; Calculate the amount of K, T and S.

Time after pumping started (m)	t/r ²	Draw down (ft)
3	4.46×10^{-6}	0.3
8	1.18×10^{-5}	1.3
20	2.95×10^{-5}	3.2
30	4.42×10^{-5}	4.1
47	6.94×10^{-5}	5.1
60	8.85×10^{-5}	5.7
80	1.18×10^{-4}	6.3
100	1.47×10^{-4}	7
160	2.36×10^{-4}	8.3
260	3.83×10^{-4}	9.2
380	5.6×10^{-4}	10.2

3. A well pumping at 400 gallons per minute has observational wells located 10, 40, 150, 300, and 400 feet away. After 200 minutes of pumping, the following draw downs were observed: In field data plotted diagram, the drawdown per log cycle is 8.8 feet and r_0 is 460 feet, find the values of T for this aquifer.

Distance	Drawdown
10	15.1
40	9.4
150	4.4
300	1.7
400	0.2

4. A community is installing a new well regionally confined aquifer with a transmissivity of 2675 ft²/day and storativity of 0.0002 .The planned pumping rate is 750 gallons per minute. There are several nearby wells tapping the same aquifer, and a hydro geologist in the charge needs to know if the new well will cause significant interference with these wells .Compute the theoretical drawdown caused by the new well after 30 days of continues pumping on the following distance; 50, 150, 250, 1000 feet.

5. Well in a confined aquifer is to be pumped at a rate of $1500 \text{ ft}^3/\text{day}$ for 10 days to allow excavation in the overlying aquitard. The aquifer is 35 ft thick and has these estimate hydraulic properties: horizontal k : 15 ft/day, $S_s=10^{-5} \text{ ft}^{-1}$. An abutting property owner is concerned that his well may go dry as a result of the pumping. The abutters well is 300 ft from the well that is to be pumped. Estimate the draw down at the abutters well after 10 days of pumping.
6. Consider a well in confined aquifer. The aquifer parameters are estimated to be T : 2100 ft/day and $S = 5 \times 10^{-5}$. The well has the radius of 1.5 ft. The well begins discharging at 25 gallons/minute at $t=t_1$. At $t-t_1 = 60$ minutes, the discharge is increased to 40 gallons/minute, at $t-t_1=120$ minute, the discharge is increased again to 75 gallons /minute. The well is shut off at $t-t_1 = 180$ minute. Determine a mathematical model for draw down in this case, and make an arithmetic plot of draw down versus time at the pumping well.
7. A confined aquifer has a transmissivity of $T= 200 \text{ ft}^2/\text{day}$ and storativity of $S=0.0002$. A fully penetrating well begins pumping in this aquifer at a rate of $1500 \text{ Ft}^3/\text{day}$. Using the Jacoup solution predict the draw down h_0-h at a radius of $r = 100$ ft at the following elapsed time; 10 minutes, 1 hour, 5hour and 24 hour.
8. Imagine well with a radius of 35 cm penetrates completely in a 30 m confined aquifer. this well pumps with constant rate of 35 lit per second and piezometric surface drops 40 meter during this pumping test.
 - a) What will be transmissivity and hydraulic conductivity, if the effective radius of this well be 400 m.
9. Imagine a well in a confined aquifer near tape salam near Mashhad which is pumping with constant rate of 1.894 cubic meter per second. The drawdown in an observational well located 61 m from pumping well is given in following Table.
 - a. Calculate aquifer's transmissivity and storativity and also draw the drawdown curve for pumping well.

Time (min)	2	4	6	8	10	14	18	24	30	40	50	80	120	210
Drawdown (m)	0.2	0.42	0.48	0.53	0.57	0.63	0.67	0.72	0.76	0.81	0.85	0.98	1.00	1.10

- b. We stop to pomp the well 240 minutes after starting the pompage, and monitor the residual drawdown versus time for 180 minutes. Calculate the transmissivity of this well with the help of recovery test.

Time (min)	1	5	7	10	15	30	40	60	80	140	180
Drawdown (m)	1.1	0.76	0.64	0.56	0.49	0.38	0.34	0.28	0.24	0.19	0.14