American University of Beirut
Geology 330P: Hydrogeology
Final Exam

Time: 3 hours
Material allowed: None

Instructions to candidates:

- The examination is in 2 sections:
  - Questions A: Short answers
  - Questions B: Short exercises

- Give the equation before computing the numerical results, stating clearly all terms in the equations.

- Do not forget the units.

- This question paper and all papers used must be handed in at the end of the exam.

☺ Good Luck ☺

Part A- Short answers

1) A well was constructed with
well diameter?

2) Define effective size, 50-percent size, and drought.

3) What conditions should a screen satisfy?

4) Explain how soil suction is measured?

5) What is the purpose of grout?

6) What are the condit

7) Complete the following table:

Model	θ	η	α
Perfect mixing			
Piston flow			
Perfect-piston flow			
Partial			
Perfect-partial			
Partial-piston flow			

8) Explain in words the following relationship. Define each term.

$$E_w = \frac{B_1 Q}{\left[(B_1 + B_2)Q + CQ^n\right]} \times 100\%$$

9) The Piazza tower was built vertical but after the population increase in the surrounding towns, it started leaning over. Explain using the principles discussed in class.

10) All else being equal, which would lose more water during a drought, a confined or unconfined aquifer?

Part B Short exercises

I. For tritium at a particular site, concentration in is 250 TU and concentration measured in a well downstream is 5 TU. Assuming constant concentration in find the range of T in the system.

$$\frac{C_{out}}{C_{in}} = \frac{1}{\left[\frac{\lambda T}{a}\left(\frac{1}{hq} + m - \frac{m}{q}\right) + 1\right]^{a}} e^{-\lambda T\left(1 - \frac{1}{hq} - m + \frac{m}{q}\right)}$$

II. Given the linear losses for a well X are 1.63 x 10^{-3} d/m^2 and the non-linear well losses are 7.45 x 10^{-7} d^2/m^5. Given the linear losses for a well Y are 2.03 x 10^{-3} d/m^2 and the non-linear well losses are 7.2x10^{-7} d^2/m^5. Determine mathematically which well is more efficient and which well was better designed? Assume same pumping rate.