

HYDROGEOLOGY
(G-318)
FINAL EXAMINATION



Date: Feb. 14th, 1998
Duration: 1:45h.

Name: _____
Student No.: _____

Read the questions carefully then answer briefly. Note that expansion by adding extra unnecessary material may count against you.

Answer all the questions. To be clearer it is sometimes needed to illustrate by sketches.

1. The time-drawdown data collected from an observation well at a distance of 50 ft from a pumped well, during a pumping test can be used to draw a distance-drawdown curve. Explain how?

2. (a) Define the most important hydrochemical units which are usually used in expressing the chemical analysis of water.

(b) Convert:

(i) 37720 p.p.m. of TDS of seawater into mg/l considering the sp. gravity of the seawater 1.025.

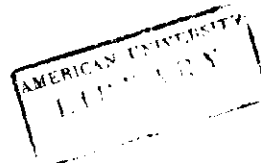
(ii) 173 p.p.m. of SO_4^{2-} into epm. The atomic weight of S=32 and of O=16.

3. Explain the following terms that may be used in the geophysical methods during groundwater exploration:

Blind zones, critical distance, velocity inversion, intercept time, free air correction.

4. (a) Derive both of the rock porosity and storativity

(b) Calculate the effective porosity considering the flowrate of a pumped well is 48 m³/d and that it took for an isotope, placed in an observation well, at a distance of 21 m from the pumped well, 22 hours to be detected. Note that the pumped well penetrates the whole



thickness of the confined aquifer which is 100 m, and the static water level reaches up to the ground surface.

5. (a) What is the great important advantage of using radioactive logs?

(b) Explain the important differences between the gamma log and neutron log.

© Compare the results of both gamma and neutron logging in case of.

Shale, granite, limestone, alternating beds of limestone and shale.

6. (a) Prove by Darcy's law, then mathematically that the cone of depression curve becomes steeper as approaching the pumped well.

(b) Suppose that a well 60 ft deep has a static water level of 10 ft and penetrates the whole saturated thickness of the aquifer. During a pumping test the flowrate was 40 gpm and the pumping level stabilized at 25 ft below the ground surface. Calculate the yield when the drawdown becomes 30 ft when the pump is placed at 50 ft from ground surface (use the attached figure, fig. 1).

Good Luck