CEL 739: Ground Water Hydrology

1st Semester 2008 **Max. Marks: 40**

Major Test **Time: 2 Hour**

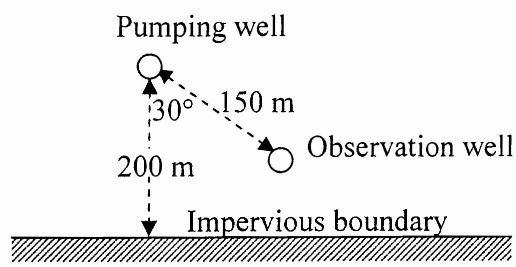
Q. 1. Starting from the N – S Equations obtain Darcy's law stating all the assumptions involved therein and defining velocity potential, intrinsic permeability, and hydraulic conductivity.

(6 Marks)

Q. 2. Sketch the stagnation points for various combinations of two wells in a uniform flow field.

(3 Marks)

Q. 3. Describe step-by-step method of locating an impervious boundary near a well. Also determine the drawdown in the observation well and percentage contribution in this drawdown by the impervious boundary as shown in Fig after 12 hours of pumping with constant flow rate 40 *l*/s from a confined aquifer having $S = 3\times10^{-5}$ and $T = 0.0064$ m^2/s.



(6 Marks)

Q. 4. State the purpose of artificial recharge of groundwater. Why does the rate of recharge from a well diminish with time?

(3 Marks)

Q. 5. What do you understand by upconing? Determine the maximum permissible pumping rate from a well without mixing saline water if density of fresh water = 1000 kg/m^3, density of saline water = 1025 kg/m^3, hydraulic conductivity of aquifer = 0.4 m/day and depth of saline water from the well strainer prior to pumping = 10 m.

(4 Marks)

Q. 6. Derive expressions for amplitude in piezometric head, time lag, wavelength, damping ratio, and volume per cycle in coastal aquifers due to oceanic tides.

(5 Marks)

Q. 7. Explain the Electric resistivity method of groundwater exploration along with Wenner and Schlumberger configurations.

(3 Marks)

Q. 8. Why is groundwater modelling important? A well (2 m diameter) in a confined aquifer (T = 400 m^2/day) is pumped such that the draw down difference of 5 m is created between the well and at a radial distance of 10 m. Solve the problem by finite difference method using the mesh as shown in Fig. Also solve the same problem using logarithmic mesh and compare both results with analytical solution.