# CE 443　　　　　Quiz -3　　　　　Spring 2007

Name _____

- **Write clearly and show all your work to get partial credit**
- **For each problem work in the units given. Indicate units on your answer.**
  Open book, open notebook

1. A frictionless wall is 6m high. Soil behind the wall is 4m of clay and 2m of sand. For clay c= 20kN/m$^2$, and $\gamma$ = 18kN/m$^3$. For sand $\gamma$ - 19.3kN/m$^3$ and $\phi$ = 35°. Assume Rankine Active state to exist. (30)
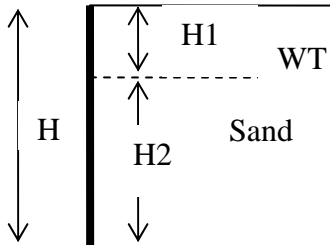
*Sketch with labels:*
   a) *Distribution of active pressure.*
   b) *The depth of tensile cracks.*

2. A wall is shown in figure. Assume at-rest condition. *On a sketch, show clearly horizontal pressure distribution, resultant horizontal force, and its point of application. Effect of water must be included.* (30)

H = 4m,     H1 = 1m,     H2 = 3m.

For sand $\phi = 32°$, above water table $\gamma = 18.2 kN/m^3$, and below WT $\gamma sat = 19.5 kN/m^3$.

3. A gravity retaining wall is 5m high, 1m thick at the top and 2.763m at the base with same slope on both faces of the wall. Embedment depth $D_F = 1m$. The wall has no footing. The soil below the wall and at the toe is a clayey sand with $c = 25kPa$, $\phi = 28°$, $\gamma = 19kN/m^3$. Backfill material is a medium sand with $\phi = 34°$ and $\gamma = 18kN/m^3$. Backfill is horizontal. Assume Coulomb active condition. Angle of wall friction is $0.67\phi$ and unit weight of wall masonry is $26kN/m^3$. (40)

*a. Determine the magnitude, inclination and location of the resultant force on the wall base.*
*b. Show pressure distribution below the wall base.*

1m

⟷

5m

Medium sand
(back-fill)

1m ↕

⟷
2.763m