University of Baghdad
College of Engineering
Civil Engineering Department

First Attempt

First Year Class
Date: June, 2013
Time: 3 Hours
Engineering Geology

Q5.A: (10%) *What are the Mechanical & Chemical Effects of the following Factors?*

1- *The Rain.*
2- *Organic Matter.*
3- *Underground Water.*
4- *The Frost.*
5- *Fluctuation of Temperature during Day & Night.*

Q5.B: (10%) *The following data are obtained for a rock specimen: Mt (total mass) =300gm, Ms (dry mass) =200gm, Gs=2.77 and S=80%. Find the total volume, volume of solids and voids, total and dry unit weight (in kN/m^3), void ratio and porosity of the specimen. If the degree of saturation increased to 95%, what will be the value of specific gravity and water content?*

Q6. A: (10%): Fill in the blanks with a suitable word or number:

1. *The major difference between Breccia and Conglomerate is .....*
2. *If the velocity of the longitudinal reflected wave was (3450 m/s) and the required time to travel from the source to its receiver was (1.0 second) and the distance between the source and receiver is 10.0m, then the depth of the upper strata is ..... meter.*
3. *If the liquid limit of soil sample is 110% and the plastic limit is 55%, the plasticity Index is ..... %.*
4. *A soil with specific gravity of (2.67) and a void ratio of (0.67) should have a dry density of ..... kN/m^3.*
5. *Streak is .....*

Q6. B: (10%) *The depth of water in a well shown in the Figure No.1; is (3 m). Below the bottom of the well lies a layer of SAND 5 meters thick is overlying a CLAY deposit. The specific gravity of the solids of SAND and CLAY are respectively 2.64 and 2.70. Their water contents are respectively 25 and 20 percent. Compute the TOTAL, PORE WATER and THE EFFECTIVE STRESS at POINTS A and B.*

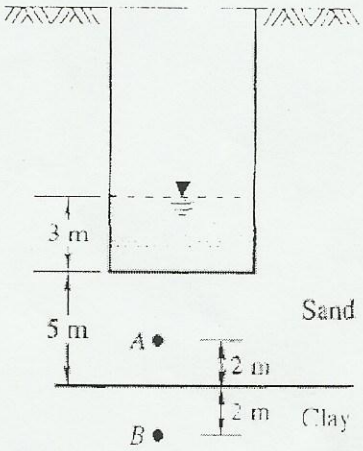

Figure No. 1

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Useful Equations and relations

* $\sigma_z = \frac{3Q}{2\pi z^2} \frac{1}{\left[1+\left(\frac{r}{z}\right)^2\right]^{5/2}} = \frac{Q}{z^2} I_B$

* $\sigma_z = \frac{Q}{\pi z^2} \frac{1}{\left[1+2(r/z)^2\right]^{3/2}} = \frac{Q}{z^2} I_w$

* $\sigma_z = \frac{Q}{(B+z)(L+z)}$

* $G_s w = S e$

* $\gamma_{bulk} = \gamma_t = \frac{G_s + Se}{1+e} \gamma_w$

* $\gamma_{sat} = \frac{G_s + e}{1+e} \gamma_w$

* $\gamma_{dry} = \frac{G_s}{1+e} \gamma_w$

* $Z = \frac{1}{2}\sqrt{(VT)^2 - X^2}$

* bulk modulus $= K_v = \frac{\sigma_n}{\epsilon_v}$

* compressibility modulus $= m_v = \frac{1}{K_v}$

* shear modulus $= G$ or $\mu = \frac{E}{2(1+\nu)}$

* bulk modulus $= K_v = \frac{E}{3(1-2\nu)}$

* modulus of elasticity $= \frac{\sigma_n}{\epsilon_n}$

* shear modulus $= \frac{\tau}{\epsilon_{shear}}$

2.75
9.4
8.4