


Instructor: Dr. Wa'el M. Albawwab
Student No.: _____
Student Name: _____
College Name: _____
Dep. / Specialist: _____
Using Dictionary: (Yes)

University of Palestine

Open-Book Final Exam
2nd Semester 2012/2013
Total Grade: 60

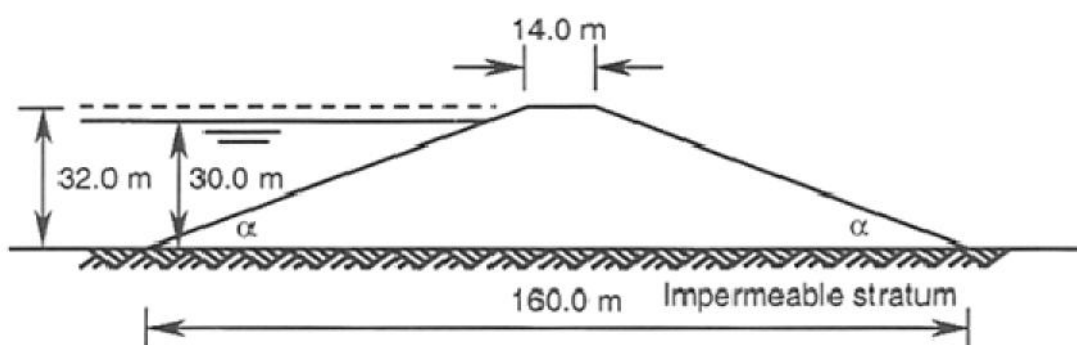
Course No: CVL 3413
Course Title: Soil Mechanics
Date: 23 – 05 – 2013
No. of Questions: 7
Time: 180 Minutes
Using Calculator: (Yes)

Q1- A sample of clay has an initial moisture content of 22.4% and an initial degree of saturation of 55% and a specific gravity of 2.71. If this soil sample was compressed to a new void ratio of 0.55, determine the percentage of sample volume change. **(10 Marks)**


Q2- A clay layer is 10 m thick with a density of 1.75 Mg/m^3 and underlain by a deep sand layer. If the clay is excavated and the bottom of excavation heaved at a depth of 6.5 m from the top surface, determine the artesian head in the sand layer. **(10 Marks)**

Q3- A test well is constructed to fully penetrate a confined 25 m thick aquifer layer, with two observation wells located 40 m and 150 m from the test well with water levels of 1.1 m and 0.4 m below the original piezometric level, respectively. If the system is producing $2.4 \text{ m}^3/\text{min}$., determine the soil hydraulic conductivity. **(10 Marks)**

Q4- Calculate the expected flow rate through the earth dam shown below if the dam material has an isotropic hydraulic conductivity of 0.26 m/day. **(10 Marks)**



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Q5- An earth embankment has a 2.5 m height and a 20 m long base and a slope of two horizontal to one vertical. Calculate the vertical stress increase at a point 7 m deep below and on the centerline of the of the embankment base. **(10 Marks)**

Q6- A normally consolidated 3 m thick clay layer is subjected to an initial overburden vertical effective stress of 250 kPa. A specimen of this soil is subjected to a consolidation lab test and two points of the loading curve were recorded as listed below. Determine the stress increment required to cause a 25 mm consolidation settlement for this soil layer in the field. **(10 Marks)**

Voids Ratio	0.80	0.75
Effective Stress (kPa)	400	800

Q7- (BONUS) It is required to prepare $2 \times 10^5 \text{ yd}^3$ of fill material with a 95 % degree of compaction and an OMC of 10%. Borrow pit A offers a soil with a natural unit weight of 115 pcf, maximum dry unit weight of 112 pcf, natural moisture content of 22%, specific gravity of 2.7, and an average cost of $\$0.5/\text{yd}^3$. Borrow pit B offers a soil with a natural unit weight of 120 pcf, maximum dry unit weight of 115 pcf, natural moisture content of 20%, specific gravity of 2.7, and an average cost of $\$0.6/\text{yd}^3$. Which offer is less expensive? **(10 Marks)**

End of Questions

Good Luck