Mansoura University
Faculty of Engineering
Structural Engineering Dept.
Geotechnical group

Soil 2

Final Exam

Soil Mechanics & Foundation
BCE-level 300
2017-2018-Jan.10th
Time: 2 hours –points:50

Any missing data can be assumed reasonably

Question # 1 (12 points)

a) **Show** how one can graphically determine the over consolidation pressure.
b) **Explain** how one can determine the immediate settlement using the strain influence factor method.
c) **What** are the main elements of a soil investigation report?
d) **write** whether the following statements are **correct** or not and **correct the wrong one:**

i. The immediate settlement ends immediately after the primary consolidation.
ii. The consolidation settlement occurs for all types of dry soils.
iii. Newmark's chart can be used only for regular shapes?
iv. For caly soil, the immediate settlement is always higher than primary?
v. The active pressure is always higher than passive pressure?

e-Determine the net and gross allowable bearing capacity for a footing B*L where: B=6.0m and L=4.0m, loaded by axial vertical load P = 50.0 tons, M_x=20.0 m.t & M_y= 40.0 m.t. it is placed at depth 3.0 m and ground water level is at 1.50 m in a clay soil having the following data: γ = 1.7 t/m^3, C = 0.7 kg/cm^2,the long direction of the footing is parallel to x-axis take factor of safety = 3.0.

Question # 2 (6 points)

a- **Explain** the Triaxial test?
b- The triaxial compression tests on three specimens of a soil sample were performed. Each test was carried out until the specimen experienced shear failure. The test data are tabulated as follows:

Specimen Number	Minor Principal Stress (Kg/cm^2)	Deviator Stress at Failure (kg/cm^2)
1	0.7	2.81
2	1.4	3.34
3	2.1	3.66

It is required to **calculate** the soil's cohesion and angle of internal friction

Question #3 (10points):

For the wall shown in Figure (1), it is driven to a sandy soil with the following properties γ = 1.7 t/m^3, ϕ = 30°, determine the following:

a. **Draw** the earth pressure (active and passive)?
b. **Calculate** the moment at point **a** and **discuss** the stability of the wall?

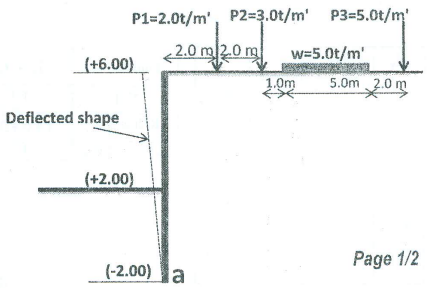


Fig.(1)

Question # 4 (12 points)

For the foundation shown in Figure (2) carries a load of 50 tons and after 3 years of the construction of the footing a 30 tons load has been add to the original load, **Determine:**

a. Primary Consolidation settlement under the center of footing after two years of its construction?.

b. Total settlement after four years from the construction of footing.

Question # 5 (10 points)

a) Explain the modes of failures of finite slopes?
b) Explain the **Ordinary method of slices?**
c) For the slope shown in Fig. (3), **determine** the factor of safety corresponding to the given failure surface

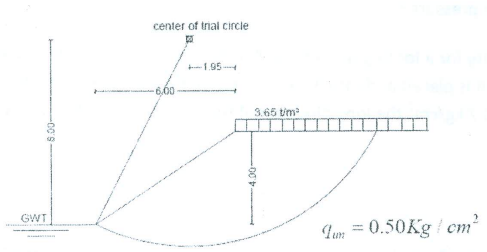


Fig.(3)

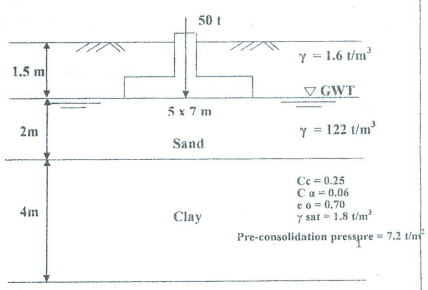
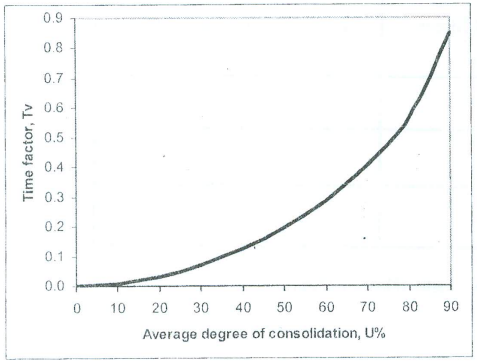
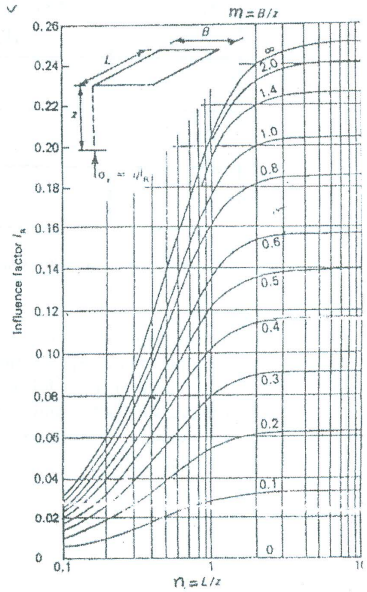


Fig.(2)





Fadum's chart

N_γ	N_q	N_c	ϕ
–	١,٠	٥,١	صفر
–	١,٥	٦,٥	٥
٠,٥	٢,٥	٨,٥	١٠
١,٠	٤,٠	١١,٠	١٥
٢,٠	٦,٥	١٥,٠	٢٠
٣,٠	٨,١	١٧,٥	٢٢,٥
٤,٥	١٠,٥	٢٠,٥	٢٥,٠

Foundation	λ_c - λ_q	λ_γ
Strip	1.0	1.0
Rectangular	1 + 0.3 B/L	1 – 0.3 B/L
Square & Circle	1.3	0.7

Good luck

Dr. Ayman Altahrany

Manoura University
Building & Construction Eng. Program
Final Exam (50%)
Course Title: Structural analysis (2)
Course Code: NSTE2

Faculty of Engineering

Time: 2 hours
Date: 3♦ Dec., 2017

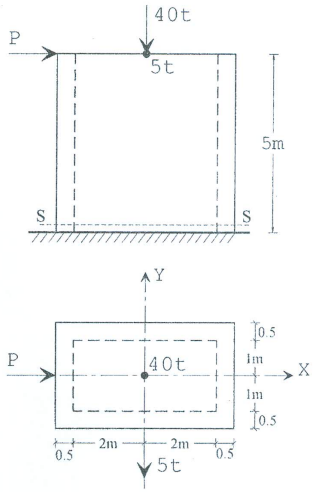
Answer All Questions

Questions No. 1: (15 Marks)

For the shown pier weighing γ= 2.5 t/m^3:

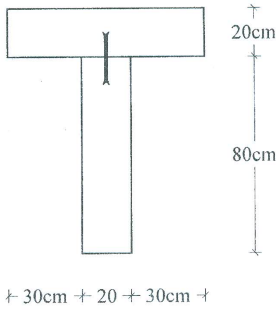
a) Determine analytically the maximum allowable value of P if the allowable normal stresses at section s-s do not exceed 1 Kg/m^2 in tension and 5 Kg/m^2 in compression. Hence draw the distribution of normal stresses at S-S.

b) If p=10t, determine the maximum normal stresses at section S-S using the Core method.



Questions No. 2: (10 Marks)

Calculate the spacing **S** of the bolts if $Q_y = 6\,t$ and the allowable shearing stress per bolts do not exceed than 350 kg/cm^2 and the diameter of bolts equal 19 *mm*.



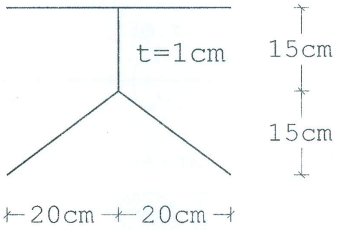
With best of luck: Dr. Mohamed El-tantawy

ions No. 3: (15 Marks)

ıe shown thin-walled steel cross section,

Draw the shear flow distribution due to a vertical shearing force of 10 ton

Find the position of the shear center.



uestions No. 4: (10 Marks)

or the shown beam fixed at "a" and "b", and ubject to the shown twisting moments, determine:

. The diameter "D" of the beam cross section if the allowable shear stress = 1.2 t/cm^2.

2. Draw twisting angle diagrams. Also calculate the maximum shearing stress (G = 800t/cm^2).