

Kaferelshiekh University		Faculty of Engineering	Department of Civil Engineering	
Four Year Students of Civil Engineering		Course title: Foundation Engineering (2)		Course code : CES4126
Date : 14-1-2019	Term : First	Total Assessment Marks : 75	Time Allowed : 3 hrs	

QUESTION (1) 25 marks

(A) Figure (1) shows sectional plan and sectional elevation for braced cut system. This system was used to excavate a square site with an area of 4x4m and with 8 m height. The braced cut consisted of two components; wood plates in the vertical direction and steel beams in horizontal direction. The vertical wood plates were fixed using horizontal steel beams (HEB 450) spaced at 2 m. properties of the soil layers are shown.

Requirements:

- 1) Calculate the thickness of wood plates. Consider $f_t = 60 \text{ kg/cm}^2$ for wood. Number of wood plates is 2 in the vertical direction. The height of the one is 4 m.
- 2) Is the steel beam HEB 450 safe? If no, what are the solutions? Consider $f_{all} = 2400 \text{ kg/cm}^2$ for steel. Properties of HEB 450 :- $h=b=450\text{mm}$, $A=218 \text{ cm}^2$, $Z_x=355 \text{ cm}^3$

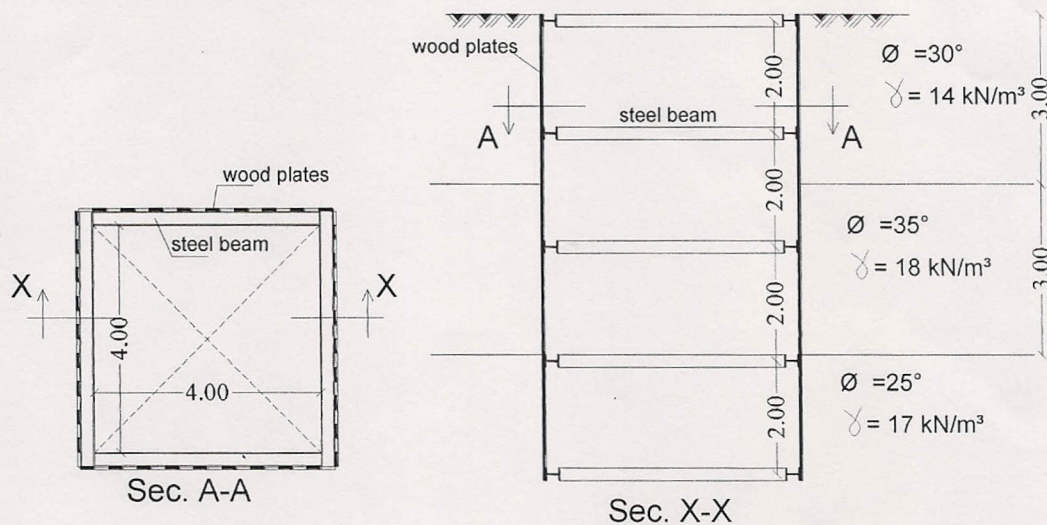


Figure (1)

(B) Answer with net sketches the following points:

- 1) State uses of braced cut systems (BCS).
- 2) Illustrate construction methods of BCS.
- 3) What are advantages and disadvantages of BCS?
- 4) State conditions of stability of excavation bottom for different types of the soil.
- 5) What is the function of the timber lagging, wale and soldier? Give an example showing these elements.

QUESTION (2) 25 marks

(A) Figure (2) shows a cylindrical open caisson with 18 m height. The external and internal diameters of the caisson are 6 m and 4 m, respectively. The water level is 4 m below the top of the caisson. Test the feasibility of sinking if the skin friction (f_s) is 20 kN/m². After sinking process, determine the minimum thickness of the concrete seal required. Consider $\sigma_c = 2400$ kN/m² and $\gamma_c = 25$ kN/m³ for concrete.

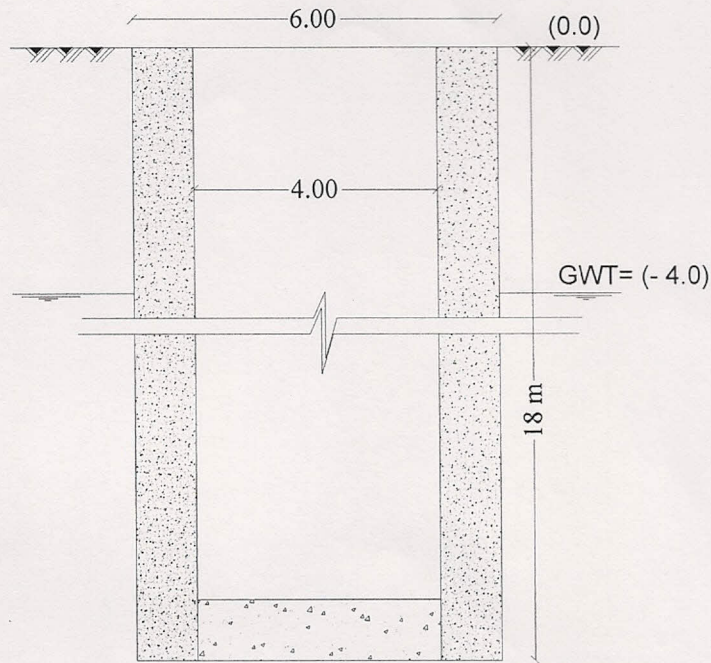


Figure (2)

(B) A box caisson of 10x20 m was sinking in the sea. The bed level is 0.0 while the foundation level (FL) is -1.25. The low water level (LWL) is 4.0 while high water level (HWL) is 6.0. Weight of super structures is 30000 kN. The caisson consisted of 8 panels. Each panel is 5x5m.

Requirements:

- 1) Determine the height of the caisson.
- 2) Assume thickness of walls is 0.3m and floor thickness is 0.4m then draw without scale plan and sectional elevation for caisson showing LWL, HWL and FL.
- 3) Check stability of the caissons.
- 4) Calculate weight of sand with density of 18 kN/m³ to sink the caisson.
- 5) Check bearing stresses under the caisson if the bearing capacity of the soil is 220 kN/m². Use the assumed concrete dimensions in Req. 2.

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(C) Answer with net sketches the following points:

- 1) What are the advantages and disadvantages of a Pneumatic Caisson compared with other types?
- 2) What are the required conditions of the box caissons?
- 3) What are the differences between piles and piers? When you choose piers as foundation type for a structure.
- 4) Illustrate construction method of the piers?
- 5) How to estimate capacity of the piers?

QUESTION (3) 25 marks

(A) It is required to dewater from an excavation of $20 \times 20 \text{ m}^2$ at bed level using sumps. The soil is sandy soil with permeability coefficient of 0.02 cm/sec . the excavation slope is 2:1 and G.L. = 0.0. G.W.L. before dewatering = -1.0, G.W.L. after dewatering = -2.50. The level of excavation bed is -2.0. The draw down curve intersected with initial ground water level at distance of 20 m from excavation slope.

Requirements

- 1) Draw sectional elevation and plan showing details of dewatering process using sumps with suitable scale.
- 2) Calculate discharge in m^3/day resulted about dewatering during the day.
- 3) Evaluate number of pumps if pump capacity is $5 \text{ m}^3/\text{hr}$.
- 4) How to aberuncate (يتخلص من) result of excavation and result of dewatering?

(B) Answer with net sketches the following points:

- 1) What are the advantages and disadvantages of dewatering process?
- 2) Show cut off method of dewatering process.
- 3) State methods of pumping of water.

QUESTION (4) 5 marks

You induced a report on the sheet pile during teaching of the course. Write in a thirty lines the aims and the main items of your report including sketch drawing.

With best wishes Dr/ Ali Basha & Dr/ Sabry EL-Morsy

