Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2016/2017

COURSE NAME	:	SITE INVESTIGATION
COURSE CODE	:	BNC40403 / BNC 31803
PROGRAMME	:	3 BNC
EXAMINATION DATE	:	JUNE 2017
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

THIS QUESTION PAPER CONSISTS OF **SEVEN (7)** PAGES

Q1 (a) Explain **FIVE (5)** elements of the need to prepare proper site layout before any construction being undertaken.

(6 marks)

(b) The boring record is shown in **Figure Q1(b)**, Determine the following :

(i) The reason of reported SPT reading is without first blows number

(ii) Explain the label of CL, SP and MH.

(iii) The reason on why the any sample recovery was less than 50 cm, Given the length of the sample is 20 " (50 cm).

(6 marks)

(c) Around this bore hole area the shallow foundation to support 500 kN of vertical loading will be constructed, based on the available SPT data.

(i) Select the suitable depth of base.

(ii) Calculate the size B of the square footing. Assumed $N_{corr} = N_{field}$ and settlement is neglected.

Use the formula :

$B < 1.22$ m ; $q_{all} = 11.98\ N_{corr} \times Fd \times St/25.4$ (kPa)

$Fd = (1+0.33\ D/B) < 1.33$

St = tolerable settlement = 25.4 mm (1 inch)

$N_{corr} = N_{Field} \times C_N$

$B > 1.22$ m ;

$q_{all} = 7.99\ N_{corr} \{(3.28B+1)/3.28B\}^2 \times Fd \times St/25.4$ (kPa)

(8 marks)

Q2 (a) In construction process of stake-out,

(i) Differentiate the necessary survey equipments

(ii) Explain the role of surveying works in construction of high-rise building before, during and after construction.

(6 marks)

(b) Explain the function of following earth moving works equipment.

(i) Vibro roller

(ii) Clam shell

(iii) Loader

(iv) Bulldozer

(v) Excavator

(vi) Sheep foot roller

(6 marks)

(c) The earth moving work project consist of 20,000 m^3 and 30,000 m^3 of compaction and excavation works respectively. All of the excavated soil can be reused for compaction work and average distance to spoil dump is 3 km. The type and predicted capacity of heavy equipments to be used are Scraper (50 m^3/hour), Dump Truck (depend on hauling distance), Vibro roller (20 m^3/hour) and Excavator (40 m^3/hour). Allocated time for this project is 45 days,

(i) Calculate how much numbers of each equipment.

(ii) Plan the mobilized equipment schedule.

(8 marks)

Q3 (a) Explain the goals of soil improvement to these parameters :

(i) Strength properties

(ii) Stiffness properties

(iii) Physical properties

(3 marks)

(b) A soft clay layer, $m_v = 2.5 \times 10^{-4}$ m^2 /kN; $c_v = 0.187$ m^2 / month, is 9.2 m thick and overlies impervious shale. An embankment, to be constructed in six months, will subject the centre of the layer to a pressure increase of 100 kN/m^2. It is expected that a roadway will be placed on top of the embankment one year after the start of construction and maximum allowable settlement after this is to be 25 mm.

Use the following formula :

$\rho_c = m_v dp 2H$; $T_v = c_v\, t / H^2$;

$U_{vr} = 1 - (1-U_v)(1-U_r)$ and chart from **Figure Q3(b)**

(i) Determine a suitable PVD system to achieve the requirements.

(ii) If smear effect is considered, what aspects will be affected ?

(iii) If elastic settlement is considered, what the effects ?

(10 marks)

(c) Evaluate the **THREE (3)** soil stabilization of hydraulic, mechanical and chemical modification in the usability and effectiveness to improve soil properties to very soft clay.

(4 marks)

(d) Differentiate the stabilization of vibroflotation and vibro replacement.

(3 marks)

Q4 (a) With the aid of sketchs, explain briefly the application of geotextile in this fields of construction :

(i) Slope stability problem

(ii) Highway

(iii) Land fill

(6 marks)

(b) There are some functions of geotextile in civil work field, list down and explain **FIVE (5)** functions.

(5 marks)

(c) The characteristic of geotextile are broadly classified as physical, hydraulic, degradation and endurance properties, show those properties.

(4 marks)

(d) Explain **THREE (3)** weaknesses of geotextile characteristics when subjected to severe environmental conditions.

(5 marks)

Q5 (a) Explain the **FOUR (4)** purposes of dewatering in excavation process.

(6 marks)

(b) Analyze the effect / impact of dewatering to clay soil.

(9 marks)

(c) The dewatering consists of **FIVE (5)** procedures, List down those procedures.

(5 marks)

- END OF QUESTIONS –

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ENGINEERING SOIL TEST BORING RECORD — November 3, 2001

Elevation (ft-msl) +182.2	Stratum Depth (ft)	Visual Soil Description	Sample Depth (ft)	Sample Recovery (in)	Soil Sym. K	Penetration N 60 (blows/ft)	Remarks and raw SPT data
+180	0.3	Top soil, grass, and roots					
		Loose gray-brown clayey fine SAND (SC)	6.0	16		7	(2+3+4)
	7.0						
+170		Soft blue-tan clayey SILT (MH)	12.0	16		3	(0+2+1) Groundwater z_w = 15.5 feet (Nov. 8, 2001)
	14.5						
		Firm yellow-tan clean to slightly silty fine SAND (SP to SP-SM)	20.5	18		32	(11+14+18)
+160	21.5						
		Firm yellow-tan clean fine to medium SAND (SP)	28.0	11		28	(+13+15+13)
	30.0						
+150		Loose white to yellow slightly silty medium to coarse SAND (SP)	36.0	11		5	(+2+3+2)
	39.0						
+140		Very stiff green fine-medium sandy CLAY (CL)	43.5	16		20	(+10+10+10)
	45.5						
+130		Stiff green-gray silty to sandy CLAY (CL)	52.5	18		15	(+6+7+8)
	60.2						
+120		Dense white medium SAND (SP) with shells	63.5	10		42	(+20+22+20)
	64.0	*REFUSAL at 64 feet*					

Soil Symbols K (Unified Soil Classification System): Top Soil, CL, MH, CH, SP

Other Symbols: Water Level

Driller:	E. Van Halen
Boring Number:	AGB-1
Date Drilled:	Oct/29/2001
Job Number	32335
Site Location:	Tampa Florida
Test Method:	ASTM D 1586
Hammer Type:	Diedrich Automatic (ER =82%)
Sampler:	Drive (split-barrel)
Drilling Method:	Hollow Stem Augers
Make of Drilling Rig:	CME-850 (truck mounted)

Notes:

N = Penetration in blows per foot (ASTM D-1586)
N_{60} = $(E_r/60) * N_{measured}$ = Energy-Corrected N-value
E_r = Energy Efficiency of Hammer Used
ER = energy ratio per ASTM D-4633

Figure Q1(b)

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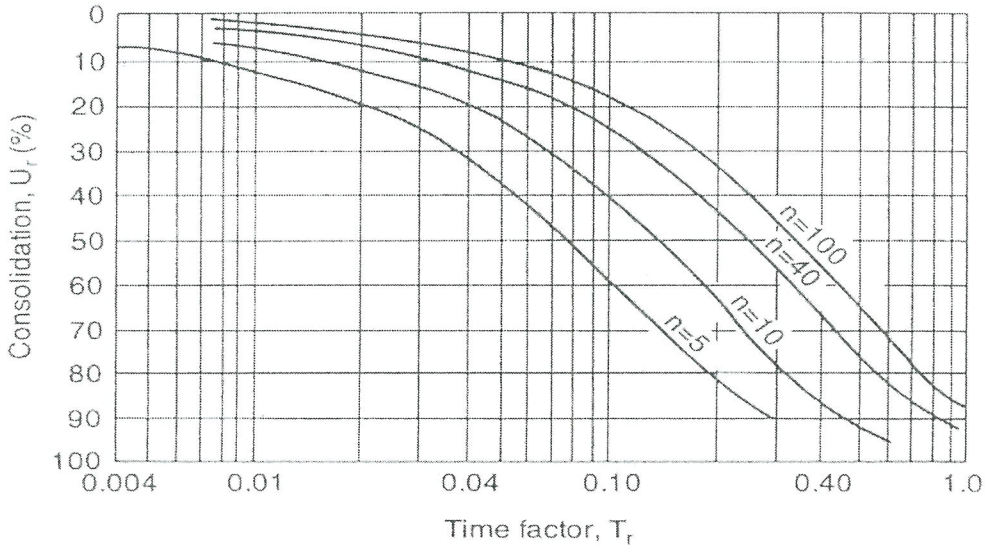
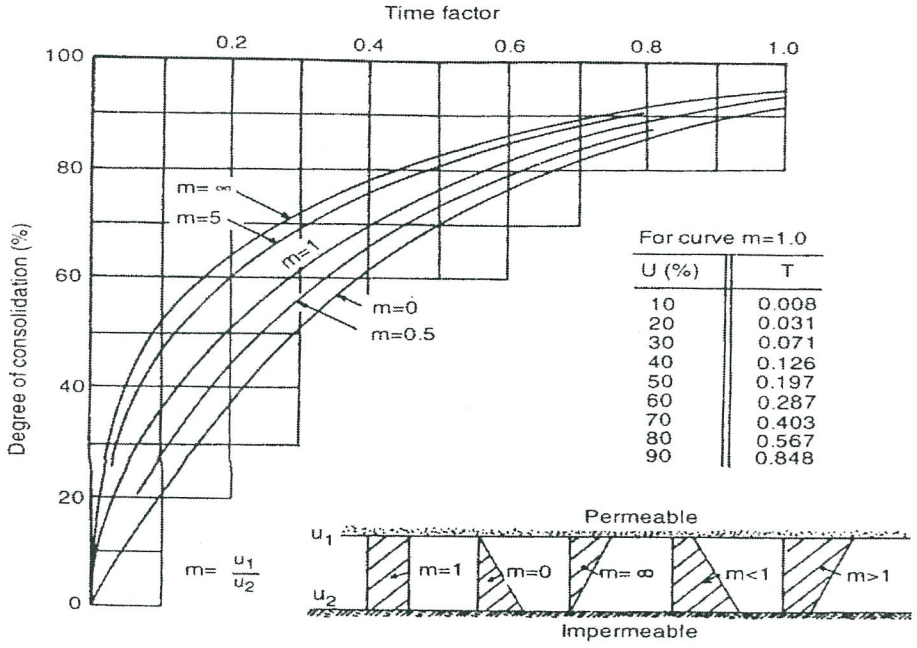


Radial consolidation



Vertical consolidation

Figure Q3(b)