Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2015/2016

COURSE NAME	:	SITE INVESTIGATION
COURSE CODE	:	BNC40403
PROGRAMME	:	3 BNC
EXAMINATION DATE	:	DECEMBER 2015 / JANUARY 2016
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER ALL QUESTION IN **SECTION 1**, AND ANSWER FOUR (4) QUESTIONS IN **SECTION 2.**

THIS QUESTION PAPER CONSISTS OF **TEN (10)** PAGES

SECTION 1

Q1 (a) In temporary works construction,

(i) Differentiate the formwork and falsework

(ii) With the aid of sketch, show the parts of elements of formwork and falsework in construction of deep foundation (driven pile + pile cap and tied beam).

(8 marks)

(b) The temporary works will be made to support 3 m height of column, beam and slab as shown in **FIGURE Q1**.

Material to be used are : Timber, Plywood, Bold with the following properties :

Plywood :

Allowable stiffness = 9.86 GPa ; Allowable flexural strength = 9.17 MPa

Timber wood, meranti light red

Allowable stiffness = 9.86 GPa ; Allowable flexural strength = 9.17 MPa

Allowable shear strength = 0.66 Mpa ;

Allowable parallel compression strength = 6 Mpa

Buckling

$P = (\sigma_{cparallel}) \times Cp \times A$; assume Cp = 0.5

Pouring concrete

$Pm = Cw\ Cc\ [150 + 9000\ R/T]$

Bold

Diameter 22.2 mm : N = 1.24 kN ; 12.7 mm : N = 0.79 kN

Conversion unit :

1 kg = 2.2 lb x 0.45

1 kPa = 0.145 psi x 6.895

= 20.93 psf x 0.048

1 kN/m3 = 6.261 pcf x 0.157

= 0.0037 pci x 271.4

Determine the size of the parts of the formwork and falsework for slab and column.

(12 marks)

SECTION 2

Q2 (a) Explain **five (5)** elements of the need and benefit to prepare proper site layout before any construction being undertaken.

(6 marks)

(b) The boring record is shown in **FIGURE Q2,**

(i) How much depth of this drilling ?

(ii) At what level the ground water level was found ?

(iii) What type of drilling method ?

(iv) Length of the sampler is 20 " or 50 cm, why the every sample recovery was less than 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) At what depth the foundation base should be positioned ?

(ii) Calculate the size B of the square footing, assumed $N_{corr} = N_{field}$

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)

Q3 (a) In construction process of stake-out,

(i) Differentiate the necessary survey equipments

(ii) Explain the role of surveying works in construction of highway before 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)

Q4 (a) Explain the goals of soil improvement to these parameters :

(i) Strength properties
(ii) Stiffness properties
(iii) Physical properties

(6 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 Q4**
Determine a suitable PVD system to achieve the requirements.

(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 soft clay and loose sand.

(4 marks)

Q5 (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
(iv) Dam

(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, mechanical, hydraulic, degradation and endurance properties, specify those properties.

(4 marks)

(d) Explain the test to obtain tensile strength of geotextile.

(5 marks)

Q6 (a) Explain the **FOUR (4)** purposes of dewatering in excavation process.

(6 marks)

(b) Describe the effect / impact of dewatering to clay and sandy soil.

(9 marks)

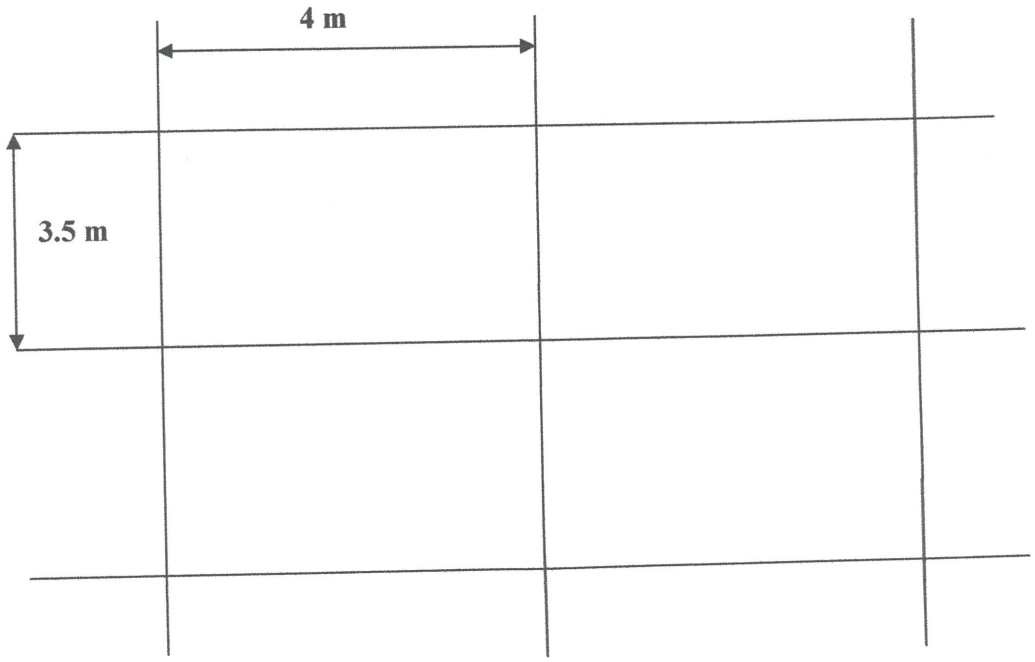
(c) The dewatering planning should include **FIVE (5)** procedures, List down those procedures.

(5 marks)

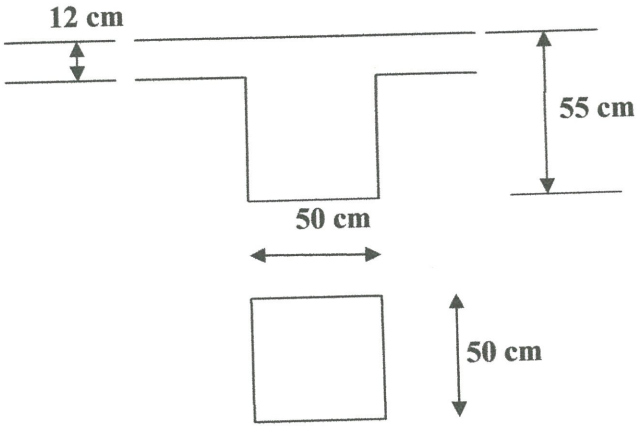
- END OF QUESTION –

FINAL EXAMINATION

SEMESTER / SESSION	: SEM I / 2015/2016	PROGRAMME	: 3 BNC
COURSE	: SITE INVESTIGATION	COURSE CODE	: BNC40403



Plan of the typical floor



Cross section of beam and column

FIGURES Q1

FINAL EXAMINATION

SEMESTER / SESSION : SEM I / 2015/2016 PROGRAMME : 3 BNC
COURSE : SITE INVESTIGATION COURSE CODE : BNC40403

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	Soft blue-tan clayey **SILT** (MH)	12.0	16		3	*(0+2+1)*
+170							*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)*
+150	30.0	Loose white to yellow slightly silty medium to coarse **SAND** (SP)	36.0	11		5	*(+2+3+2)*
	39.0	Very stiff green fine-medium sandy **CLAY** (CL)	43.5	16		20	*(+10+10+10)*
+140	45.5						
+130		Stiff green-gray silty to sandy **CLAY** (CL)	52.5	18		15	*(+6+7+8)*
	60.2	Dense white medium **SAND** (SP) with shells	63.5	10		42	*(+20+22+20)*
+120	64.0	*REFUSAL at 64 feet*					

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

Other Symbols: Water Level

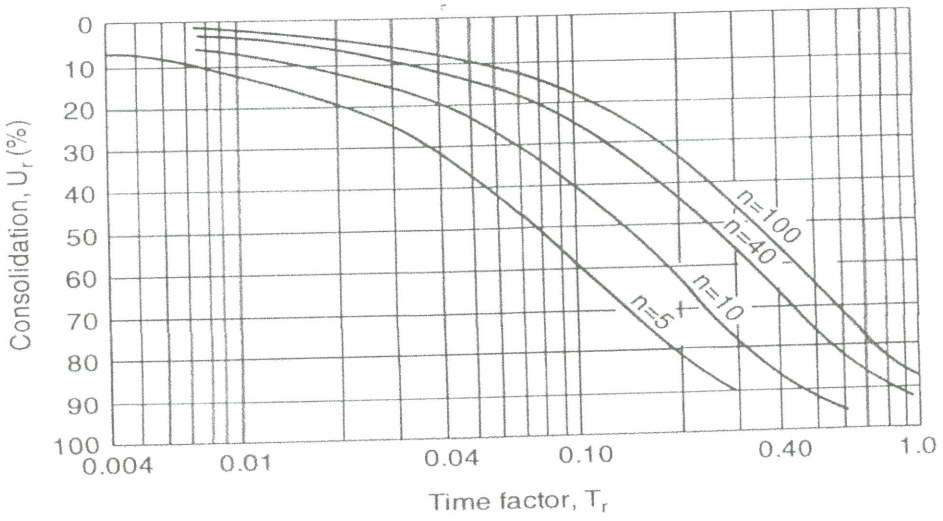
Driller:	E. Van Halen
Boring Number:	AGB-1
Date Drilled:	Oct/29/2001
Job Number	32335
Site Location:	Tampa, Florida
Test Method:	ASTM D 1586
Hammer Type:	Diedrich Automatic (ER =82%)
Sampler:	Drive (split-barrel)
Drilling Method:	Hollow Stem Augers
Make of Drilling Rig:	CME-850 (truck mounted)

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

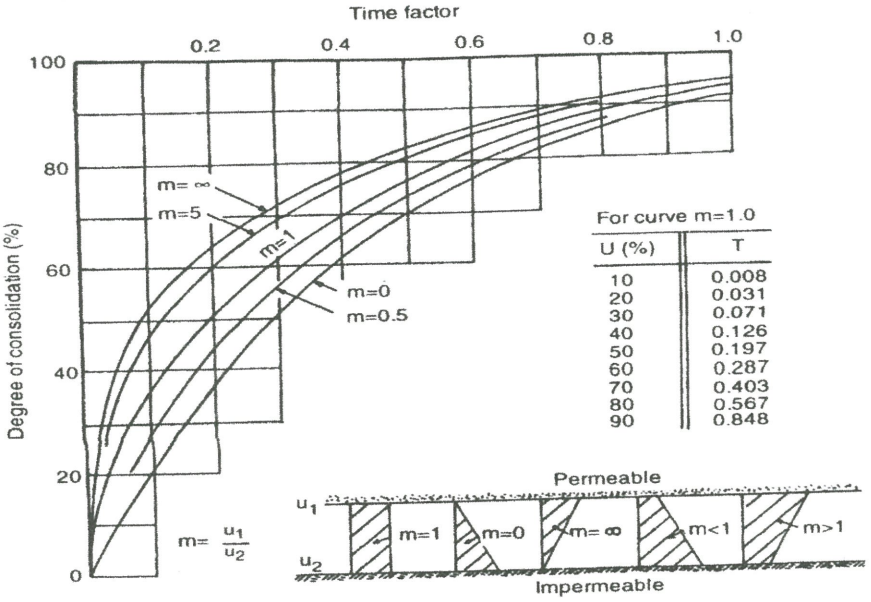
FIGURES Q2

FINAL EXAMINATION

SEMESTER / SESSION : SEM I / 2015/2016 PROGRAMME : 3 BNC
COURSE : SITE INVESTIGATION COURSE CODE : BNC40403



Radial consolidation



Vertical consolidation

FIGURES Q4