University of Brighton

School of the Environment

EXAMINATION SOLUTIONS

Semester (1 or 2)	Academic year (eg 2000/2001)
1	2004/2005

Module code	CN215
Title	SOIL MECHANICS
Examiner	KEVIN STONE

Instructions to candidates
(eg no of questions to be attempted, time allowed, any other instructions)

4 QUESTIONS FROM 5
2 HOUR EXAM
ALL FROM SECTION 'A'
1 FROM SECTION B

Special requirements
(eg graph paper, formula books, handout, etc)

GRAPH PAPER
HANDOUT

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EXAMINATION SOLUTIONS

MODULE CODE CN215 **YEAR** 04/05

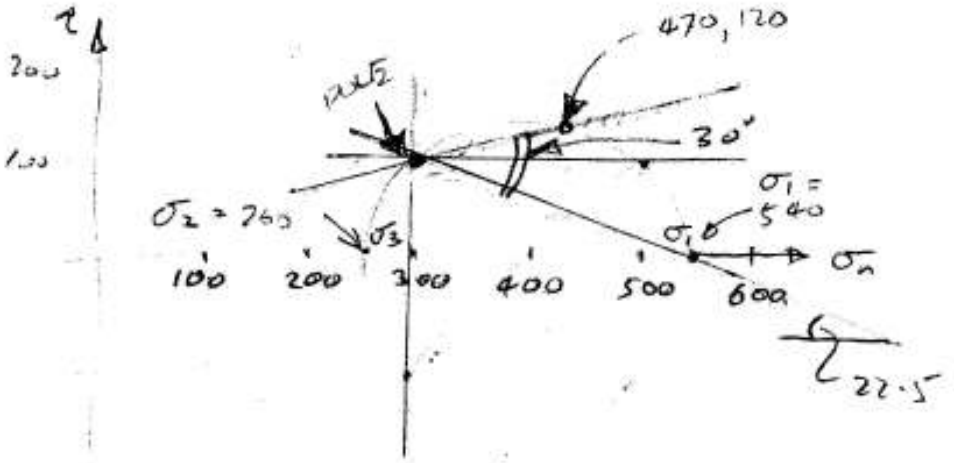
QUESTION N° 1A	**MARKS**

$A_{area} = 100 \times 100 = 10^{4}\ mm^2$

$\sigma_2 = \frac{5}{10^{-2}} = 500\ kPa$

$\sigma_x = \frac{3}{10^{-2}} = 300\ kPa$

$\tau_{2n} = \frac{1}{10^{-2}} = 100\ kPa$ $\quad \tau_{22} = -100\ kPa$



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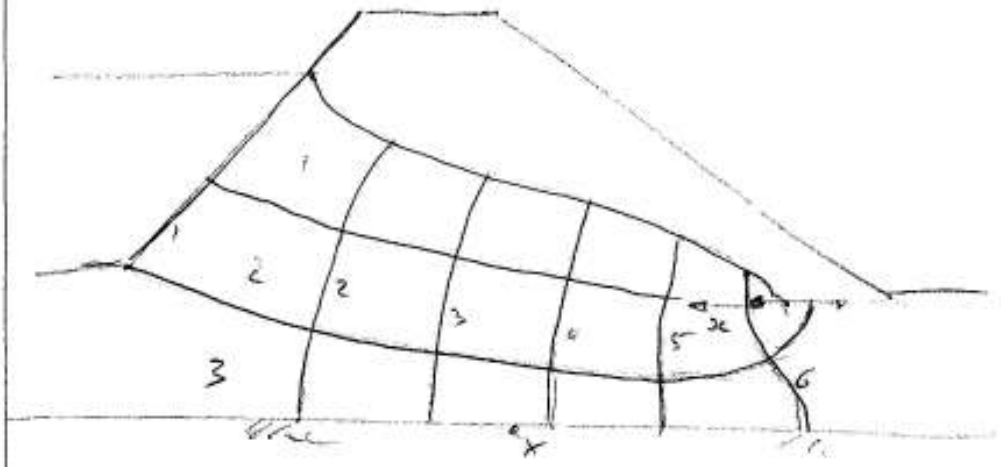
EXAMINATION SOLUTIONS

MODULE CODE CN215 **YEAR** 04/05

QUESTION N° 2A	**MARKS**



SKETCH OR CONSTRUCT FROM $x = x_0 - \frac{z^2}{4x_0}$

a) $Q = kH \frac{N_f}{N_e} \frac{a}{b}$ $\quad \frac{a}{b} = 0.7$

$= 5.6\times10^{-6} \times \frac{3}{6} \times 0.7 \quad = 1.176\times10^{-3}\ m^3/s$

$= 1.02\ m^3/day/m.$

b) $H = 4.1 \quad z = -3$

$u = 7.1$

$P_{RESS} = 69.6\ kPa$

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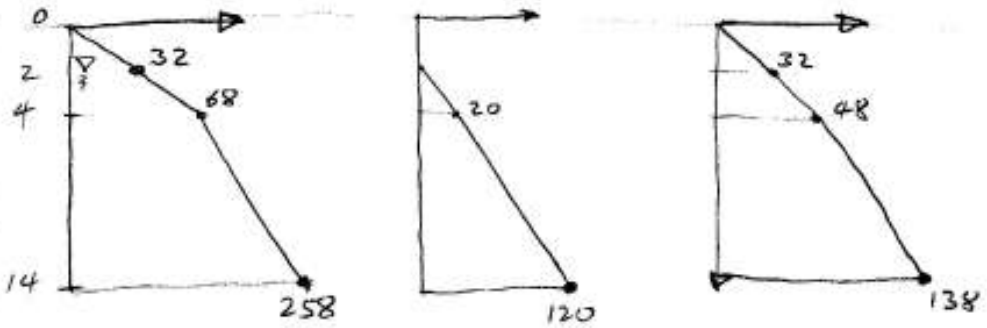
MODULE CODE CN215 **YEAR** 04/05

QUESTION N° 3A.	**MARKS**

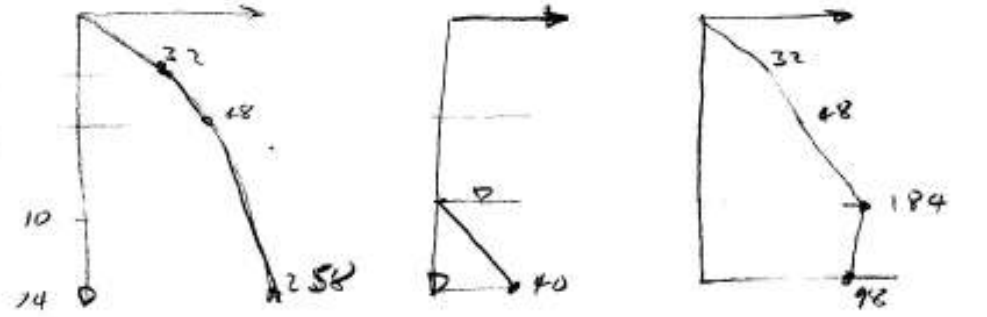
NB: SAT. WEIGHT OF FINE SAND = 18kN/m³ NOT GIVEN IN PAPER, CORRECTED IN CLASS.

UNDRAINED - SHORT TERM LOADING $\Delta u = \Delta\sigma$

DRAINED - LONG TERM $\Delta u = 0$ $\Delta\sigma' = \Delta\sigma$



σ u σ'



REDUCE WATER TABLE INCREASES EFFECTIVE STRESS AND LEADS TO CONSOLIDATION SETTLEMENT $\rho_{CALC} = \Delta\sigma_v' \cdot m_v \cdot H$

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QUESTION N° 1B	**MARKS**

a) UND. TRIAX.

b) DRAINED TRIAX.

NB: CORRECTION TO PAPER WHERE 1.25% GIVEN.

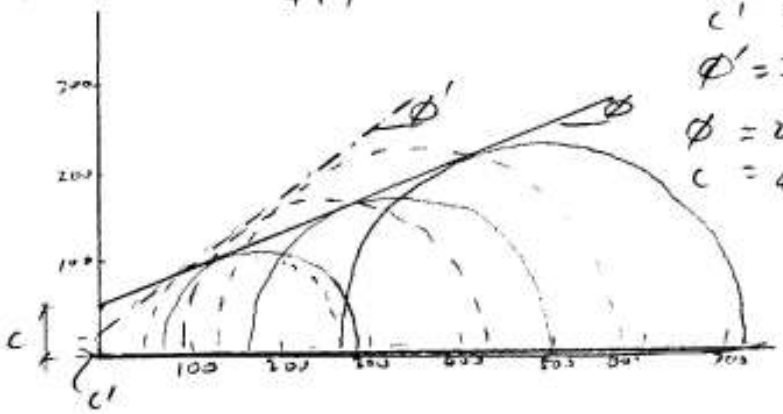
DEVIATOR STRESS $(\sigma_1 - \sigma_3)_f$ = $\frac{\text{DEV. LOAD}}{\text{AREA}}$

AREA OF PISTON = $\frac{\pi}{4} \times 40^2 \times 1.125$

= 1414 mm²

TOTAL STRESS

	$\frac{\sigma_1 - \sigma_3}{2}$	$\frac{\sigma_1 + \sigma_3}{2}$	$\frac{\sigma_1 + \sigma_3}{2} - u$
1	110	177	157
2	166	333	253
3	232	499	364



c' 20 kPa

$\phi' = 32°$

$\phi = 22°$

c = 42 kPa

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QUESTION N° 2B	**MARKS**

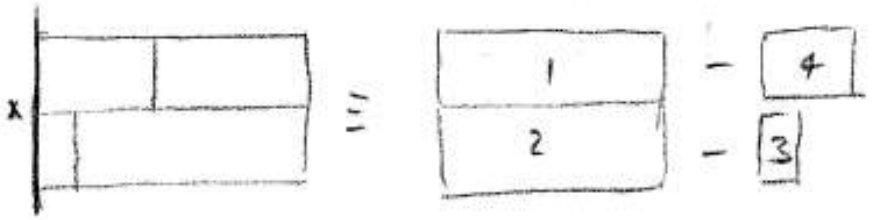
NEWMARK CHART.

No. INFLUENCE AREAS = 21.5

VERTICAL STRESS = 0.1005 × 21.5 × 40

= 4.3kN/m²

FADUM CHART.



SHAPE	m	n	I	$\sigma_s = \Sigma I$
1	0.5	1.75	0.133	5.32
2	0.5	1.75	0.133	5.32
3	0.5	0.25	0.048	1.92
4	0.5	0.75	0.109	4.36

$\sigma_v = 1+2-3-4 = 10.64 - 6.28$ = 4.36 kPa.