UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2017/2018

COURSE NAME	:	SOIL MECHANICS
COURSE CODE	:	BPD 14402 / BPD 20502
PROGRAMME CODE	:	BPC
EXAMINATION DATE	:	JUNE / JULY 2018
DURATION	:	2 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

THIS QUESTION PAPER CONSISTS OF **SIX (6)** PAGES

Q1 Shear strength of a material is the load per unit area or pressure that it can withstand before undergoing shearing failure.

Explain with examples, **FIVE (5)** conditions why shear strength is required to be assessed.
(25 marks)

Q2 Soils are stable if the stress level is maintained or water content remains constant. However, when stresses applied in soil mass are changed, it deforms and causes settlement in some instances.

(a) Define Settlement and Consolidation.
(5 marks)

(b) Differentiate between Casagrande method and Taylor method using information as provided in **Appendix I**. Please use the provided form in **Figure Q2(b)**.
(20 marks)

Q3 Soil sieving can be performed in either wet or dry condition.

(a) Describe the smallest and largest mesh openings for determining grain size distribution.
(4 marks)

(b) Illustrate the methodology to carry out a sieve analysis on a sample of clay.
(7 marks)

(c) Discuss the conditions of the soil whether to use wet sieving or dry sieving.
(14 marks)

Q4 Disturbed and undisturbed samples are collected through many sampling methods including test pits, thin walled sampler, Mazier sampler, soil penetration test, and cone penetration test.

Differentiate the process of the above mentioned methods.
(25 marks)

- END OF QUESTIONS -

APPENDIX I

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Sample information:

Sample no: 1A
Location: Batu Pahat, Johor, Malaysia
Coordinate: 1.8500° N, 102.9300° E
Depth: 5 meter
Type of soil: Clay
Unit weight: 18 kN/m^3

Table Q2(b) Oedometer test result

Effective stress (kN/m^2)	25	50	100	200	400	800	200	50
Void ratio (e)	0.85	0.82	0.71	0.57	0.43	0.3	0.4	0.5

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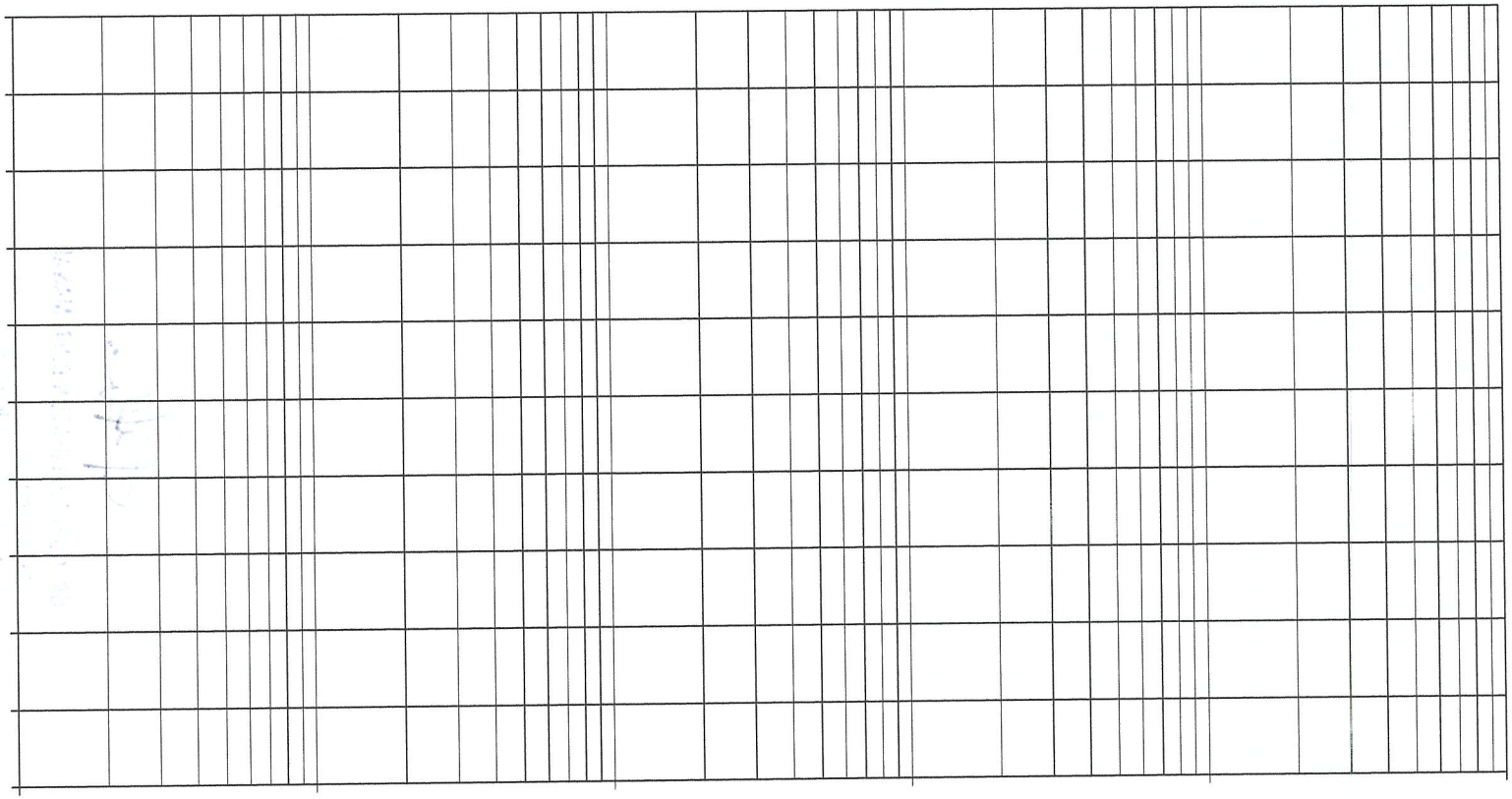

Figure Q2(b)

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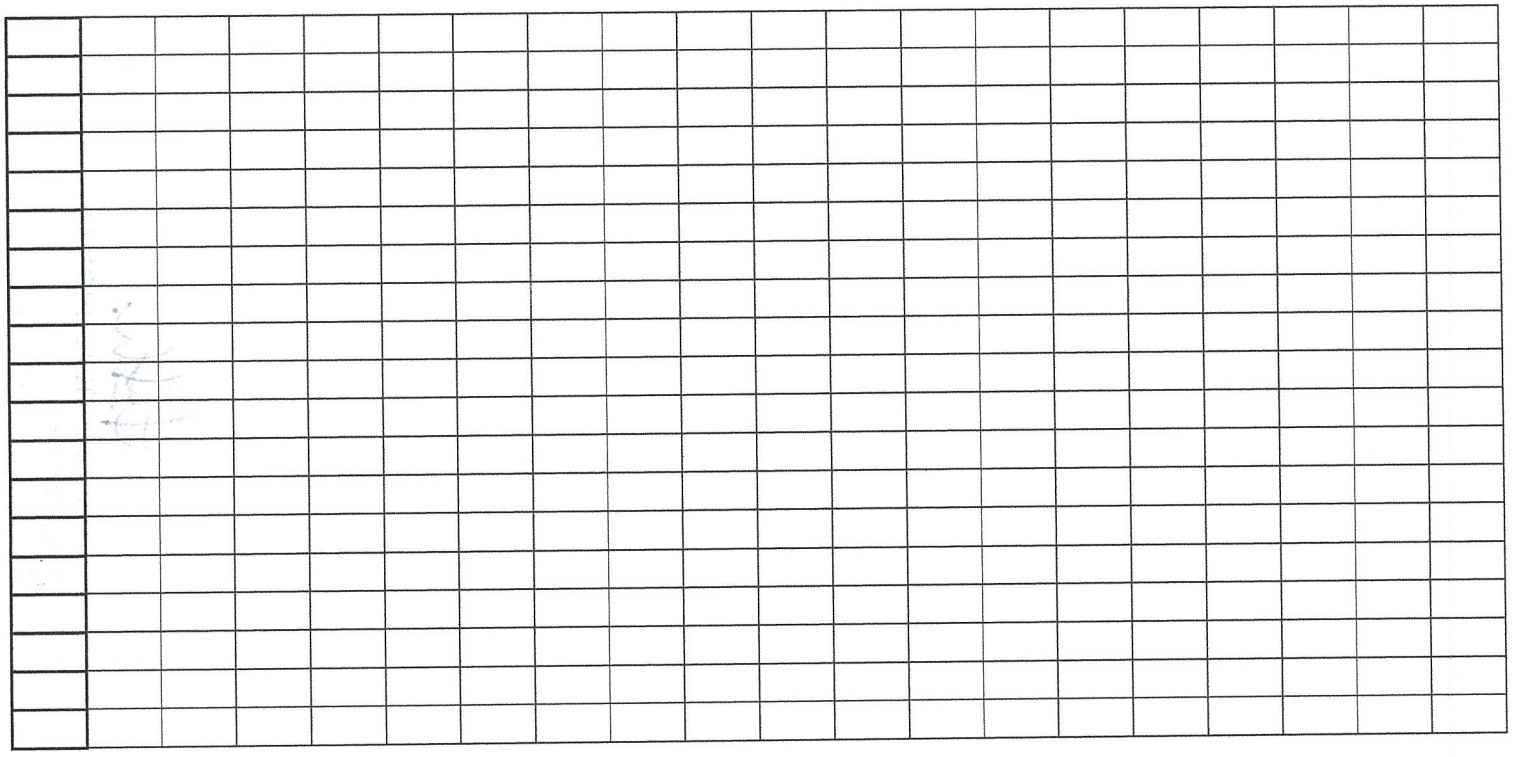

Figure Q2(b)

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Equation for m_v:

$$m_v = \frac{\Delta e}{\Delta \sigma'} \quad \frac{1}{1+e_{avg}}$$

Where, $e_{avg} = \frac{e_1 + e_2}{2}$

Gradient of the curve $= \frac{\Delta e}{\Delta \sigma'}$

Therefore, m_v = Gradient of the curve X $\left[\frac{1}{1 + \left[\frac{e_1 + e_2}{2} \right]} \right]$

Equation for C_c:

$$C_c = \frac{e_1 - e_2}{\sigma'_1 - \sigma'_2}$$

Equation for σ'_o:

$$\sigma'_o = \frac{(\gamma sat - \gamma w)\, H}{2}$$