

16

SULIT



**BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN MALAYSIA**

JABATAN KEJURUTERAAN AWAM

**PEPERIKSAAN AKHIR
SESI DISEMBER 2014**

CC304: GEOTECHNICS 1

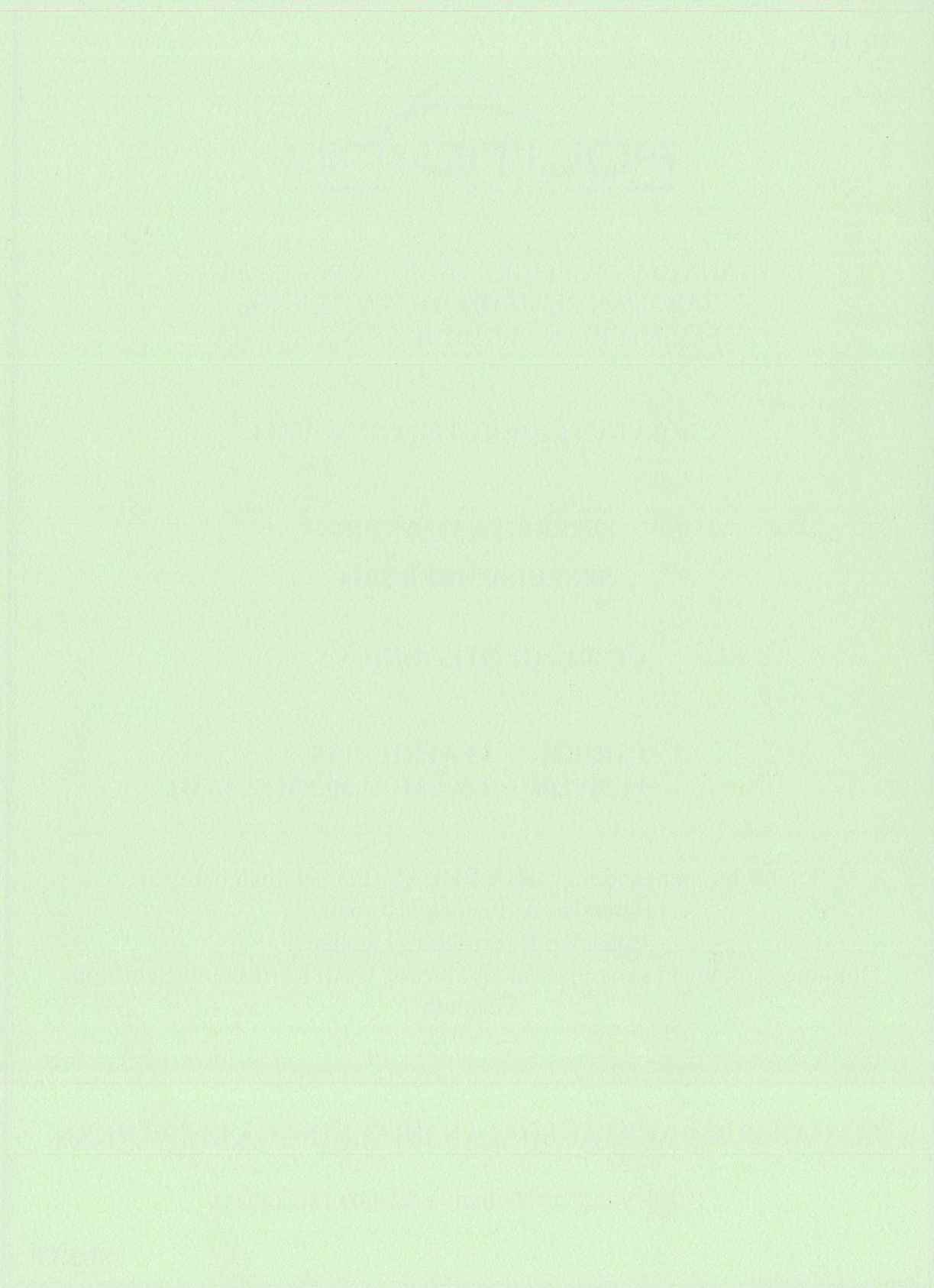
**TARIKH : 13 APRIL 2015
TEMPOH : 2.30PM – 4.30 PM (2 JAM)**

Kertas ini mengandungi **DUA BELAS (12)** halaman bercetak.
Bahagian A: Pendek (10 soalan)
Bahagian B: Struktur (4 soalan)
Dokumen sokongan yang disertakan : Kertas Graf, Kertas Graf Semi-log,
Formula

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SULIT



SECTION A : 40 MARKS**BAHAGIAN A : 40 MARKAH****INSTRUCTION:**

This section consists of **TEN (10)** short questions. Answer **ALL** questions.

ARAHAN:

*Bahagian ini mengandungi **SEPULUH (10)** soalan pendek. Jawab **SEMUA** soalan.*

CLO1
C1**QUESTION 1**

State **FOUR (4)** examples of metamorphic rock.

SOALAN 1

*Berikan **EMPAT (4)** contoh batuan metamorfik.*

[4 marks]

[4 markah]

CLO1
C2**QUESTION 2**

Describe the following types of soil.

- (i) Transported soil
- (ii) Residual soil

SOALAN 2

Jelaskan tentang tanah berikut.

- (i) Tanah terangkut
- (ii) Tanah baki

[4 marks]

[4 markah]

SULIT

CLO1
C2**QUESTION 3**

Coarse grained soils are subdivided into well graded (W) and poorly graded (P) varieties, depending upon the Uniformity coefficient (C_u) and Coefficient of curvature (C_c). Describe the term well graded gravel (GW) in accordance to C_u and C_c properties.

SOALAN 3

Tanah berbutir kasar boleh dibahagikan kepada yang bergred baik (W) dan kurang bergred (P) . bergantung kepada pekali Keseragaman (C_u) dan Pekali kelengkungan (C_c). Terangkan maksud kerikil yang bergred baik (GW) berdasarkan kepada ciri-ciri C_u dan C_c .

[4 marks]

[4 markah]

CLO1
C1**QUESTION 4**

Draw the Three Phase Soil diagram.

SOALAN 4

Lukiskan rajah Tiga Fasa Tanah.

[4 marks]

[4 markah]

CLO1
C2**QUESTION 5**

The undisturbed sample of soil has a wet weight of 30kg and a volume of 0.017m^3 . Calculate the unit weight of soil.

SOALAN 5

Satu sampel tanah tak terganggu mempunyai berat basah 30kg dan isipadu 0.017m^3 . Kirakan berat unit tanah.

[4 marks]

[4 markah]

CLO1
C2**QUESTION 6**

A soil sample obtained from a construction site has a mass and volume of 148.8g and 86.2cm³. After drying the sample in an oven for 24 hours, the new mass for the sample is 106.2g. Determine the moisture content and bulk density of soils.

SOALAN 6

Satu sampel tanah diperolehi dari tapak pembinaan mempunyai jisim dan isipadu 148.8g dan 86.2cm³. Selepas dikeringkan didalam oven selama 24 jam, jisim baru bagi sampel tanah tersebut adalah 106.2g. Tentukan kandungan lembapan dan ketumpatan pukal sampel tanah tersebut.

[4 marks]

[4 markah]

CLO1
C2**QUESTION 7**

Explain briefly the relationship between horizontal stress, vertical stress and effective stress using appropriate equations.

SOALAN 7

Terangkan dengan ringkas hubungkait antara tegasan ufuk, tegasan pugak dan tegasan berkesan dengan menggunakan rumus yang bersesuaian.

[4 marks]

[4 markah]

CLO1
C1**QUESTION 8**

State **TWO (2)** permeability test methods for the following location:

- (i) In laboratory
- (ii) At site

SOALAN 8

Nyatakan DUA (2) kaedah ujian kebolehtelapan bagi lokasi yang berikut:

- (i) Di makmal
- (ii) Di tapak

[4 marks]

[4 markah]

CLO1
C2**QUESTION 9**

Under a constant head of 40 cm, 480 ml of water percolates through a soil sample with 5cm in length and 60cm^2 in cross-sectional areas for 10 minutes. Calculate the coefficient of permeability of the soil.

SOALAN 9

Di bawah turus tetap sebanyak 40cm, 480 ml air meresap melalui satu sampel tanah 5cm panjang dan luas keratan rentas 60cm^2 , kadar aliran sampel pada masa 10 minit ialah 480ml. Kira pekali kebolehtelapan tanah tersebut.

[4 marks]

[4 markah]

CLO1
C2**QUESTION 10**

Differentiate between Elastic Settlement and Consolidation Settlement.

SOALAN 10

Bezakan antara Enapan Anjal dan Enapan Pengukuhan.

[4 marks]

[4 markah]

SECTION B : 60 MARKS**BAHAGIAN B : 60 MARKAH****INSTRUCTION:**

This section consists of **FOUR (4)** structured questions. Answer **THREE (3)** questions only.

ARAHAN:

Bahagian ini mengandungi EMPAT (4) soalan berstruktur. Jawab THREE (3) soalan sahaja.

QUESTION 1**SOALAN 1**

CLO1
C3

- a) After a series of laboratory tests, the following data was established for fine soil :
Satu siri ujikaji di makmal, berikut adalah data yang diperolehi bagi tanah halus:

| | |
|---|-------|
| Liquid limit <i>Had Cecair</i> | 48% |
| Plastic limit <i>Had Plastik</i> | 32% |
| Clay content <i>Kandungan Tanah Liat</i> | 24.2% |

- i) Calculate the activity of the soil.
Kirakan aktiviti untuk tanah tersebut
- [4 marks]
[4 markah]
- ii) Determine the liquidity index of the soil when its natural moisture content is 39%.
Tentukan Indeks Kecairan tanah apabila kandungan lembapan semulajadi adalah 39%.
- [4 marks]
[4 markah]

CLO1
C3

- b) The following results were recorded during a Casagrande Test and Plastic Limit Test on a cohesive soil.

Data berikut adalah keputusan Ujian Casagrande dan Ujian Had Keplastikan ke atas satu sampel tanah jelekit.

| | | | | | |
|---|----|----|----|----|------|
| No. of blow (n) <i>Bil. Hentakan (n)</i> | 98 | 70 | 55 | 35 | 18 |
| Water Content (%) <i>Kandungan air (%)</i> | 13 | 24 | 32 | 45 | 59.4 |

The results from the plastic limit test were:

Keputusan ujian had keplastikan tanah adalah:

| Test no. <i>No ujian</i> | Mass of can (g) <i>Jisim tin (g)</i> | Mass of wet soil + can (g) <i>Jisim tanah basah + tin(g)</i> | Mass of dry soil + can (g) <i>Jisim tanah kering + tin (g)</i> |
|-----------------------------|---|---|---|
| 1 | 8.1 | 20.7 | 18.7 |
| 2 | 8.4 | 19.6 | 17.8 |

Determine the following:

Tentukan yang berikut:

- i) Plot graph moisture content versus no of blow.
Plotkan graf kandungan lembapan melawan bilangan hentakan.

[6 marks]

[6 markah]

- ii) Calculate Liquid Limit, Plastic Limit and Plasticity Index of the soil.

Kirakan Had Cecair, Had Plastik dan Indeks Keplastikan tanah tersebut.

[6 marks]

[6 markah]

QUESTION 2

SOALAN 2

CLO1
C3

A Standard Proctor Compaction test was conducted on a sample of sandy clay. The results obtained are as follows:

Ujikaji pepadatan bagi proktor piawai telah dijalankan ke atas sampel tanah liat berpasir.

Keputusannya seperti berikut:

| | | | | | | |
|--|------|------|------|------|------|------|
| Bulk density (kg/m^3) | 1755 | 1825 | 1884 | 1913 | 1893 | 1864 |
| <i>Ketumpatan pukal (kg/m^3)</i> | | | | | | |
| Moisture content (%) | 12 | 14 | 16 | 18 | 20 | 22 |
| <i>Kandungan Lembapan (%)</i> | | | | | | |

Draw the graph of dry density against moisture content and determine the maximum dry density and optimum moisture content.

Lakarkan graf ketumpatan kering melawan kandungan lembapan dan tentukan ketumpatan kering maksimum dan kandungan lembapan optimum.

[20 marks]

[20 markah]

CLO1
C3

QUESTION 3

SOALAN 3

The soil layers on a certain site were found to be as follows:

Lapisan tanah di suatu kawasan tapak menunjukkan seperti berikut

| Depth (m) <i>Kedalaman</i> | Types of Soil <i>Jenis tanah</i> | Unit Weight (kN/m^3) <i>Berat unit (kN/m^3)</i> |
|-------------------------------|--|--|
| 0 – 3.5 | Coarse Sand <i>Pasir Kasar</i> | (drained) $\gamma_d = 19.6$ (<i>kering</i>) $\gamma_d = 19.6$ (saturated) $\gamma_{\text{sat}} = 20.4$ (<i>tepu</i>) $\gamma_{\text{sat}} = 20.4$ |
| 3.5 – 7.5 | Silty Clay <i>Tanah Liat Berkelodak</i> | $\gamma_d = 17.4$ $\gamma_{\text{sat}} = 18.0$ |

Water table depth is 2m below the ground surface.

Aras air bumi berada pada kedalaman 2m di bawah permukaan tanah.

- i) Sketch the profile of the soil layer.

Lakarkan profil lapisan tanah tersebut.

[3 marks]

[3 markah]

- ii) Calculate and plot the total stress and effective stress at the depth of 0m, 2m, 3.5m and 7.5m.

Kira tegasan jumlah dan tegasan berkesan pada kedalaman 0m, 2m, 3.5m dan 7.5m.

[17 marks]

[17 markah]

QUESTION 4

SOALAN 4

CLO1
C3

A Triaxial Test was conducted on three samples taken from the same soil. The test results are shown in table below. Determine the values of c and (ϕ) of the soil sample.

Ujian tiga paksi telah dijalankan ke atas tiga sampel yang diambil dari tanah yang sama.

Keputusan ujian ditunjukkan di dalam jadual dibawah. Tentukan nilai c dan ϕ sampel tanah tersebut.

| Sample <i>Sampel</i> | Minor Stress, σ_3 <i>Tegasan minor, σ_3</i> (kN/m ²) | Deviaor Stress, $\sigma_3 - \sigma_1$ <i>Tegasan Deviator, $\sigma_3 - \sigma_1$</i> (kN/m ²) |
|-------------------------|---|--|
| A | 20 | 150 |
| B | 80 | 160 |
| C | 245 | 195 |

[20 marks]

[20 markah]

SOALAN TAMAT

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LAMPIRAN FORMULA CC 304 – GEOTECHNICS 1

1. $V_t = V_s + V_v = V_s + V_w + V_a$
2. $G_s = \frac{m_s}{V_s \rho_w}$
3. $\rho_d = \frac{\rho_b}{1+w}$
4. $\rho_b = \frac{Ms(1+w)}{v}$
5. $\rho_b = \frac{Gspw(1+w)}{1+e}$
6. $\rho_d = \frac{Gspw}{1+e}$
7. $S = \frac{wG_s}{e}$
8. $\rho_{sat} = \frac{\rho_w(G_s+e)}{1+e}$
9. $\rho_d = \frac{G_s \rho_w (1-A_r)}{(1+\omega G_s)}$
10. $n = \frac{e}{1+e}$
11. $k = \frac{VL}{Aht}$
12. $k = 2.303 \frac{aL}{At} \log_{10} \left(\frac{h_1}{h_2} \right)$ atau $k = \frac{aL}{At} \ln \left(\frac{h_1}{h_2} \right)$
13. $k = \frac{2.3039 q \log_{10} \left(\frac{r_2}{r_1} \right)}{\pi(h_2^2 - h_1^2)}$ atau $k = \frac{q \ln \left(\frac{r_2}{r_1} \right)}{\pi(h_2^2 - h_1^2)}$
14. $k = \frac{q \log_{10} \left(\frac{r_2}{r_1} \right)}{2.727 H (h_2 - h_1)}$ atau $k = \frac{q \ln \left(\frac{r_2}{r_1} \right)}{2\pi H (h_2 - h_1)}$
15. $K_H = \frac{1}{H} (K_1 H_1 + K_2 H_2 + \dots + K_n H_n)$
16. $K_v = \frac{H}{\frac{H_1}{K_1} + \frac{H_2}{K_2} + \dots + \frac{H_n}{K_n}}$
17. $\sigma = \rho gh = \gamma h$
18. $\sigma = \sigma' + u$
19. $u = \gamma_w h$
20. $T_v = \frac{C_v t}{d^2}$
21. $C_v = \frac{0.848 d^2}{t_{90}}$
22. $C_v = \frac{k}{\gamma_w M_v}$

Plasticity Chart

Carta Keplastikan

