

SULIT



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

JABATAN KEJURUTERAAN AWAM

PEPERIKSAAN AKHIR

SESI DISEMBER 2015

CC502 : GEOTECHNICS 2

TARIKH : 05 APRIL 2016

MASA : 2.30 PM – 4.30 PM (2 JAM)

Kertas ini mengandungi **SEPULUH (10)** halaman bercetak.

Bahagian A: Soalan Pendek (10 soalan)

Bahagian B: Struktur (4 soalan)

Dokumen sokongan yang disertakan : 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. You are required to answer all the questions.

ARAHAN :

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

QUESTION 1**SOALAN 1**

CLO1
C1 List **FOUR (4)** information that can be gathered during site reconnaissance (site survey).

*Senaraikan **EMPAT (4)** maklumat yang boleh dikumpulkan semasa peninjauan tapak.*

[4 marks]

[4 markah]

QUESTION 2**SOALAN 2**

CLO1
C2 Soil investigation is one of the phases in Site Investigation which consist of sampling and lab testing. Explain briefly **TWO (2)** common test in site investigation

*Penyiasatan tanah merupakan salah satu fasa di dalam Penyiasatan Tapak yang terdiri daripada persampelan dan ujian di makmal. Terangkan dengan ringkas **DUA (2)** ujian yang biasa dijalankan dalam penyiasatan tanah.*

[4 marks]

[4 markah]

QUESTION 3

SOALAN 3

CLO1
C1 Define the flow lines and equipotential lines

Takrifkan garis aliran dan garis sama upaya.

[4 marks]

[4 markah]

QUESTION 4

SOALAN 4

CLO1
C3 Calculate the factor of safety against sliding using the Total Stress Analysis Method.

Kirakan nilai faktor keselamatan terhadap kegelinciran menggunakan kaedah Analisa Tekanan Jumlah.

$$C_u = 25 \text{ kN/m}^2$$

$$\Phi = 0$$

$$\gamma = 18 \text{ kN/m}^3$$

$$\Theta = 88^\circ$$

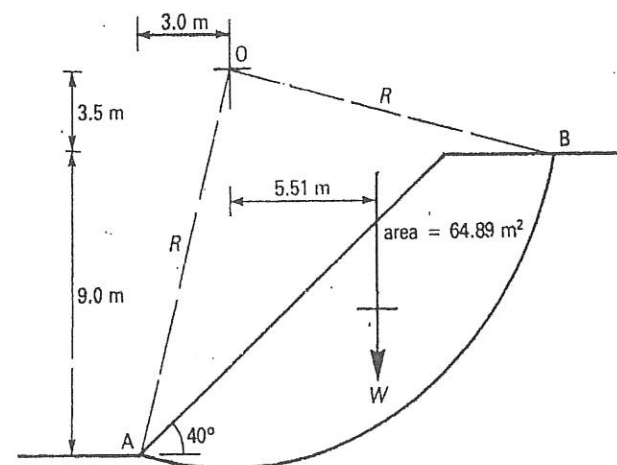


Figure A4/ Rajah A4

[4 marks]

[4 markah]

QUESTION 5

SOALAN 5

CLO1
C1 State TWO (2) types of retaining wall with the aid of diagrams.

Dengan bantuan gambarajah nyatakan DUA (2) jenis tembok penahan.

[4 marks]

[4 markah]

QUESTION 6

SOALAN 6

CLO1
C1 With the aid of a diagram, illustrate TWO (2) types of shallow foundation of each.

Dengan bantuan gambarajah terangkan dengan ringkas DUA (2) jenis asas cetek.

[4 marks]

[4 markah]

QUESTION 7

SOALAN 7

CLO1
C2 Explain briefly TWO (2) differences between shallow foundation and deep foundation.

Terangkan dengan ringkas DUA (2) perbezaan diantara asas cetek dan asas dalam.

[4 marks]

[4 markah]

QUESTION 8

SOALAN 8

CLO1
C1 State **TWO (2)** factors in considering the suitability of a shallow.

Berikan DUA (2) faktor utama yang perlu dipertimbangkan bagi memastikan kedalaman asas cetek adalah bersesuaian.

[4 marks]

[4 markah]

QUESTION 9

SOALAN 9

CLO1
C1 List **FOUR (4)** situations that require pile foundation.

Senaraikan EMPAT (4) keadaan di mana penggunaan asas cerucuk diperlukan.

[4 marks]

[4 markah]

QUESTION 10

SOALAN 10

CLO1
C2 Explain briefly the End Bearing Pile with the aid of a diagram.

Dengan bantuan gambarajah, terangkan dengan ringkas cerucuk hujung tanggung.

[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 TIGA (3) soalan sahaja.

QUESTION 1

SOALAN 1

A dam is constructed on a permeable stratum underlain by an impermeable rock as in **Figure B1**. A row of sheet pile is installed at the upstream face. If the soil permeability coefficient is 7.2×10^{-3} mm/sec:

*Sebuah empangan dibina di strata telap air yang lapisan bawahnya adalah batu tidak telap air seperti dalam **Rajah B1**. Satu baris cerucuk keping dipasang di bahagian hulu. Jika pekali kebolehtelapan tanah ialah 7.2×10^{-3} mm/s:*

CLO2
C3 a) Calculate the rate of flow in $m^3/day/m$ length.
Kirakan kadar alir resipan dalam unit $m^3/jam/m$ panjang.

[13 marks]

[13 markah]

CLO2
C4 b) Determine the pore water pressure at point A.
Tentukan tekanan liang tanah pada point A.

[7 marks]

[7 markah]

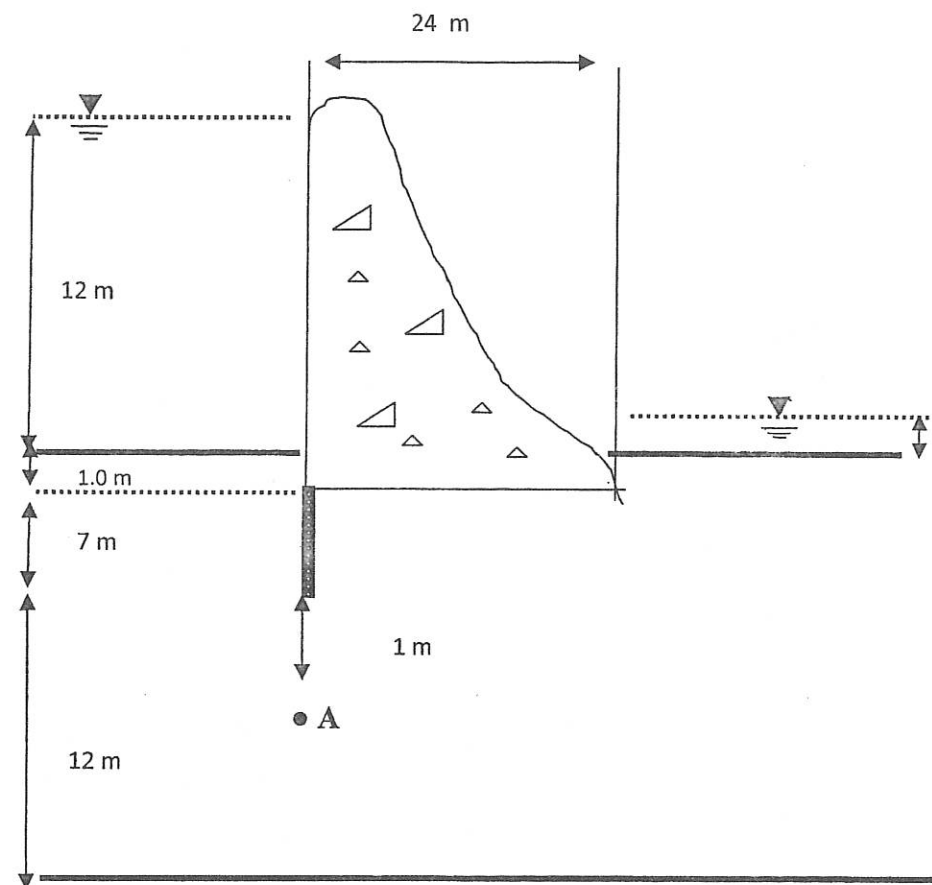


Figure B1 / Rajah B1

QUESTION 2

SOALAN 2

Figure B2 shows fortress saturated clay that has a slope ratio of 1:1.5 and has a vertical height of 10m, bulk unit weight of the soil is 19.5 kN/m^3 and cohesion is 40kPa.

Rajah B2 menunjukkan keratan rentas benteng tanah liat tepu yang mempunyai nisbah cerun 1:1.5 dan mempunyai ketinggian menegak 10m. Berat unit pukal tanah ialah 19.5 kN/m^3 dan kejelekitan adalah 40kPa.

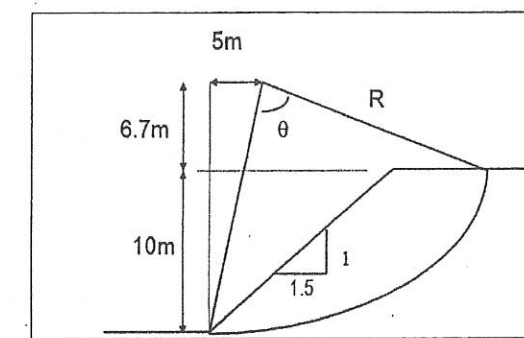


Figure B2 / Rajah B2

CLO 2
C4 Determine the factor of safety against shear failure if $d = 6.4\text{m}$ and after tension crack happens $d' = 5.6\text{m}$.

Tentukan faktor keselamatan terhadap kegagalan ricih jika, $d = 6.4\text{m}$ dan selepas retak tegangan $d' = 5.6\text{m}$.

- Ignoring the tension crack
Mengabaikan kesan retak tegangan
- Allowing for the tension crack without water
Mengambil kira kesan retak tegangan tanpa dipenuhi air
- Allowing for the tension crack when full of water
Mengambil kira kesan retak tegangan apabila dipenuhi air

[20 marks]

[20 markah]

QUESTION 3

SOALAN 3

By referring to Figure B3,

Berpandukan Rajah B3,

- CLO2 C3 a) Calculate the total active earth pressure (ΣPa) at the depth of 7.0 m
 Kirakan jumlah tujah aktif tanah (ΣPa) pada paras 7.0m

[14 marks]

[14 markah]

- CLO2 C4 b) Determine the location of the resultant force (Y) from the wall base.
 Tentukan titik tindakan tujah aktif (Y) dari tapak tembok.

[6 marks]

[6 markah]

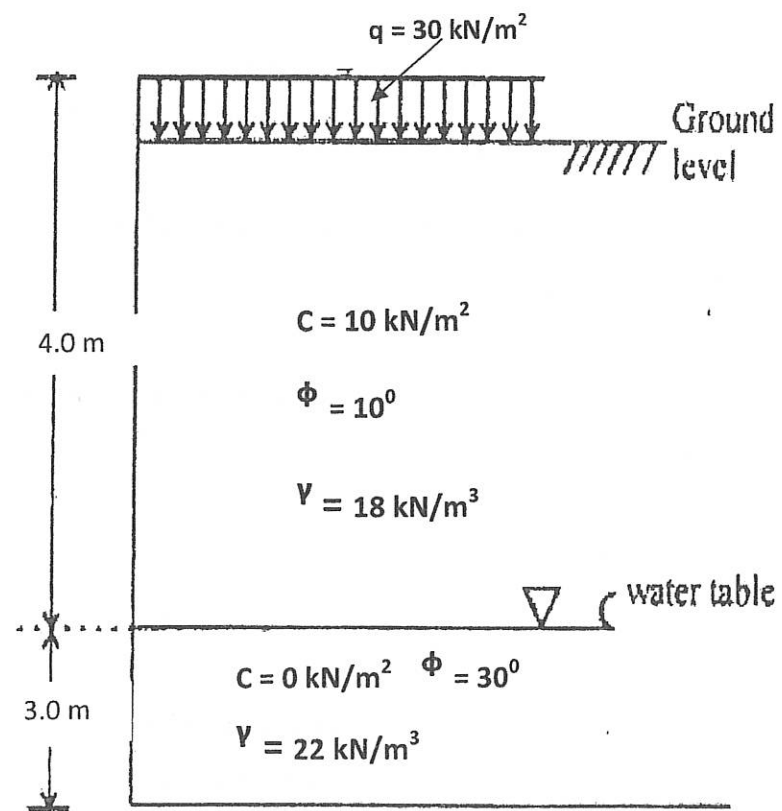


Figure B3/ Rajah B3

QUESTION 4

SOALAN 4

- CLO2 C4 **Figure B4** shows a strip foundation. By referring to the details in the figure, determine the width "B" to support the applied loads when the water level is at base. Unit weight of water is 10 kN/m³.

Rajah B4 menunjukkan satu asas jalur. Dengan merujuk perincian di dalam rajah tersebut. Tentukan lebar "B" tersebut bagi menampung beban yang dikenakan apabila aras air berada di aras dasar. Berat tentu air ialah 10 kN/m³.

[20 marks]

[20 markah]

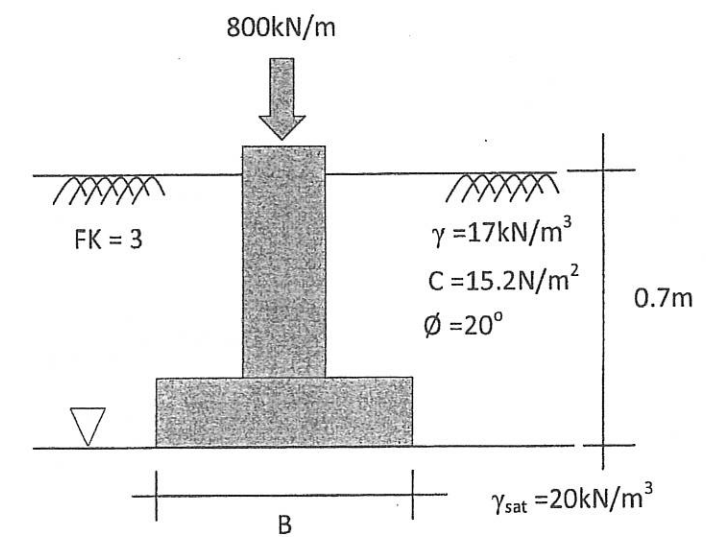


Figure B4 / Rajah B4

SOALAN TAMAT

LAMPIRAN FORMULA (CC502 - GEOTECHNICS 2)

$$Q = k H \frac{N_f}{N_e}$$

$$I = \frac{\Delta h}{\Delta s}$$

$$u_x = u_w \left(\frac{N_x}{N_s} \Delta H - (-Z_x) \right)$$

$$K_a = \frac{1 - \sin \phi}{1 + \sin \phi}$$

$$K_p = \frac{1 + \sin \phi}{1 - \sin \phi}$$

$$K_a = \cos \beta \cdot \frac{\cos \beta - \sqrt{(\cos^2 \beta - \cos^2 \phi)}}{\cos \beta + \sqrt{(\cos^2 \beta - \cos^2 \phi)}}$$

$$K_a = \frac{\sin^2(\alpha + \phi) \cos \delta}{\sin \alpha \sin(\alpha - \delta) \left[1 + \sqrt{\frac{\sin(\phi + \delta) \sin(\phi - \beta)}{\sin(\alpha - \delta) \sin(\alpha + \beta)}} \right]^2}$$

$$K_a = \left[\frac{\sin \phi}{1 + \sqrt{\frac{\sin(\phi + \delta) \sin \phi}{\cos \delta}}} \right]^2$$

$$Z_c = \frac{2C}{\gamma} \sqrt{\frac{1}{K_a}}$$

$$\sigma_a = k_a [\gamma Z + q] - 2C\sqrt{K_a}$$

$$Z_c = \frac{2C}{\gamma} \sqrt{\frac{1}{K_a}}$$

$$FOS = \frac{CR^2\theta}{Wd}$$

$$FOS = \frac{C_A R^2 \theta_A + C_B R^2 \theta_B}{Wd}$$

$$P = \frac{Rv}{B} \left(1 \pm \frac{6e}{B} \right)$$

$$FOS = \frac{Rv \tan \delta}{RH}$$

$$e = B/2 - \bar{X}$$

$$FOS = \frac{\mu R}{\mu T}$$

$$FOS = \frac{N_c C_u}{\gamma Z}$$

$$FOS = \frac{C_u}{N\gamma Z}$$

$$FOS = \frac{\sum CL' + w \cos \alpha \tan \phi}{\sum w \sin \alpha}$$

$$FOS = \frac{\sum CL'(W \cos \alpha - \mu L)}{\sum W \sin \alpha}$$

$$FOS = \frac{CR^2\theta'}{Wd + PwYc}$$

Correction Table $\frac{\Delta a}{a + \Delta a}$ Earth Dam (Non Filter)

Slope, α	30	6	90	120	150	180
$\frac{\Delta a}{a + \Delta a}$	0.37	0.32	0.25	0.18	0.10	0

STRIP FOUNDATION

$$q_u = c_u N_c + \gamma DN_q + 0.5 \gamma BN_\gamma$$

CIRCLE FOUNDATION

$$q_u = 1.3c_u N_c + \gamma DN_q + 0.3 \gamma BN_\gamma$$

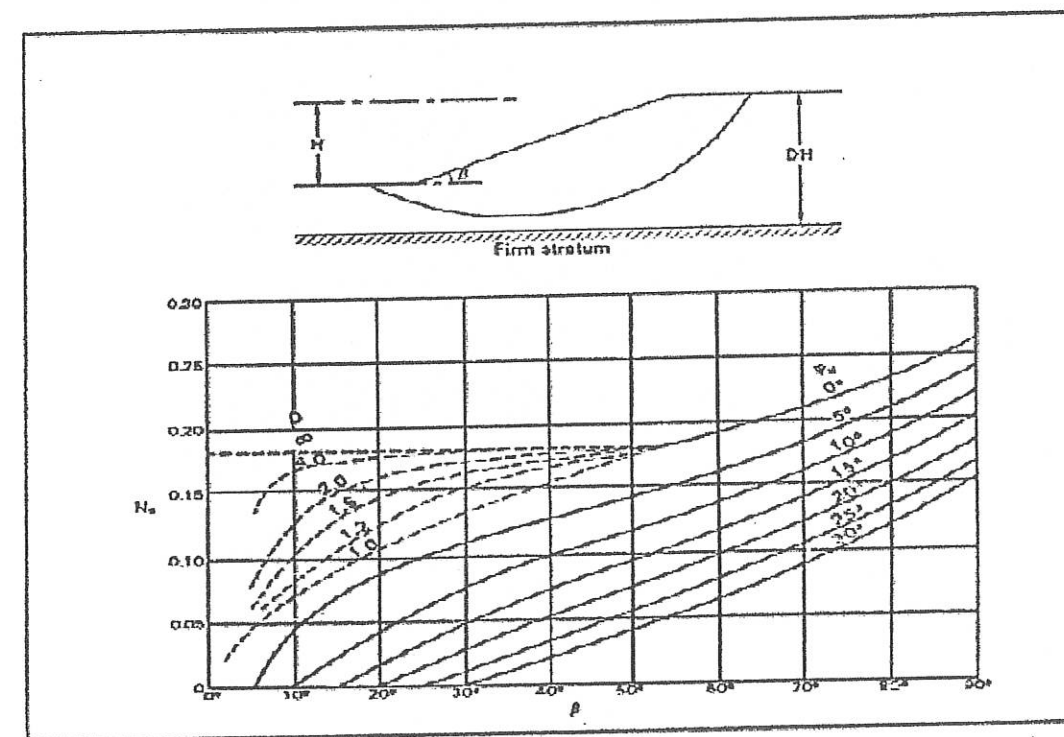
SQUARE SPREAD FOUNDATION

$$q_u = 1.3c_u N_c + \gamma DN_q + 0.4 \gamma BN_\gamma$$

RECTANGLE SPERAD FOUNDATION

$$q_u = c_u N_c [1 + 0.3 (B/L) + \gamma DN_q + 0.5 \gamma BN_\gamma [1 - 0.2 (B/L)]]$$

Taylor Stabilization Chart



BEARING CAPACITY FACTORS FOR GENERAL SHEAR

ANGLE OF FRICTION ϕ (DEGREES)	TERZAGHI			MEYERHOF			HANSSEN		
	N_c	N_q	N_{γ}	N_c	N_q	N_{γ}	N_c	N_q	N_{γ}
0	5.70	1.00	0.00	5.10	1.00	0.00	5.10	1.00	0.00
2	6.30	1.22	0.18	5.63	1.20	0.01	5.63	1.20	0.01
4	6.97	1.49	0.38	6.19	1.43	0.04	6.19	1.43	0.05
5	7.34	1.64	0.50	6.49	1.57	0.07	6.49	1.57	0.07
6	7.73	1.81	0.62	6.81	1.72	0.11	6.81	1.72	0.11
8	8.60	2.21	0.91	7.53	2.06	0.21	7.53	2.06	0.22
10	9.60	2.69	1.21	8.34	2.47	0.37	8.34	2.47	0.39
12	10.76	3.29	1.70	9.28	2.97	0.60	9.28	2.97	0.63
14	12.11	4.02	2.23	10.37	3.59	0.92	10.37	3.59	0.97
15	12.86	4.45	2.50	10.98	3.94	1.13	10.98	3.94	1.18
16	13.68	4.92	2.94	11.63	4.34	1.37	11.63	4.34	1.43
18	15.52	6.04	3.87	13.10	5.26	2.00	13.10	5.26	2.08
20	17.69	7.44	4.97	14.83	6.40	2.87	14.83	6.40	2.95
22	20.27	9.19	6.61	16.88	7.82	4.07	16.88	7.82	4.13
24	23.36	11.40	8.68	19.32	9.60	5.72	19.32	9.60	5.75
25	25.13	12.72	9.70	20.72	10.66	6.77	20.72	10.66	6.76
26	27.09	14.21	11.35	22.25	11.85	8.00	22.25	11.85	7.94
28	31.61	17.81	15.15	25.80	14.72	11.19	25.80	14.72	10.94
30	37.16	22.46	19.73	30.14	18.40	15.67	30.14	18.40	15.07
32	44.04	28.52	27.49	35.49	23.18	22.02	35.49	23.18	20.79
34	52.64	36.50	36.96	42.16	29.44	31.15	42.16	29.44	28.77
35	57.75	41.44	42.40	46.12	33.30	37.15	46.12	33.30	33.92
36	63.53	47.16	51.70	50.59	37.75	44.43	50.59	37.75	40.05
38	77.50	61.55	73.47	61.35	48.93	64.07	61.35	48.93	56.17
40	95.66	81.27	100.39	75.31	64.20	93.69	75.31	64.20	79.54
42	119.67	108.75	165.69	93.71	85.37	139.32	93.71	85.37	119.96
44	151.95	147.74	248.29	118.37	115.31	211.41	118.37	115.31	165.58
45	172.29	173.29	294.50	133.87	134.87	262.74	133.87	134.87	200.81
46	196.22	204.19	426.96	152.10	158.50	328.73	152.10	158.50	244.65
48	258.29	287.85	742.61	199.26	222.30	526.45	199.26	222.30	368.67
50	347.51	415.15	1153.15	266.88	319.06	873.86	266.88	319.06	568.57