(23)

SULIT

POLITEKNIK MALAYSIA

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN TINGGI

JABATAN KEJURUTERAAN AWAM

PEPERIKSAAN AKHIR

SESI JUN 2017

DCG5122: GEODESY 1

TARIKH : 02 NOVEMBER 2017
MASA : 8.30 PAGI – 10.30 PAGI (2 JAM)

Kertas ini mengandungi **LAPAN (8)** halaman bercetak.
Bahagian A: Esei Berstruktur (2 soalan)
Bahagian B: Esei Berstruktur (4 soalan)
Dokumen sokongan yang disertakan: Formula

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SECTION A: 50 MARKS
BAHAGIAN A: 50 MARKAH

INSTRUCTION:
This section consists of **TWO (2)** structured essay questions. Answer **all** questions.

ARAHAN:
*Bahagian ini mengandungi **DUA (2)** soalan esei berstruktur. Jawab **semua** soalan.*

QUESTION 1
SOALAN 1

CLO1
C1

(a) "Geodesy has been defined as the discipline that deals with the measurement and representation of the Earth's surface, including its gravity field in a three-dimensional time varying space."
"Geodesi telah ditakrifkan sebagai disiplin yang berkaitan dengan pengukuran dan perwakilan permukaan Bumi, termasuklah medan graviti dalam ruang tiga dimensi yang berbeza-beza ruang."

i. Based on the statement, give **THREE (3)** general concept of geodesy.
*Berdasarkan pernyataan tersebut, berikan **TIGA (3)** konsep umum geodesi.*

[6 marks]
[*6 markah*]

ii. Briefly explain the meaning of Physical Geodesy.
Terangkan maksud geodesi fizikal.

[4 marks]
[*4 markah*]

CLO1 C2 (b) Geodesy serves as a foundation for the mapping and referencing of all geospatial data.
Geodesi adalah asas bagi pemetaan dan rujukan semua data geospatial.

Based on the statement answer the following questions:
Berdasarkan pernyataan tersebut jawab soalan berikut:

i. Explain in brief the main function of Geodesy in Geomatics Field.
Terangkan secara ringkas fungsi utama geodesi dalam bidang geomatik.

[5 marks]
[*5 markah*]

ii. Describe **FIVE (5)** objectives of Geodesy.
*Huraikan **LIMA (5)** objektif geodesi.*

[10 marks]
[*10 markah*]

QUESTION 2
SOALAN 2

CLO2 C2 (a) Sketch the suitable diagram to show the different between Geocentric Coordinate and Topocentric Coordinate.
Lakarkan gambarajah yang sesuai untuk membezakan di antara Koordinat Geosentrik dan Koordinat Toposentrik.

[10 marks]
[*10 markah*]

CLO2 C3 (b) Calculate horizontal distance (X) and vertical distance (Y) on ellipsoid surface at a place with a latitude of 35°, a = 6377304m and b = 6356102 m. (Give your answer in km).
Kira jarak mendatar (X) dan jarak pugak (Y) di atas permukaan elipsoid di kedudukan latitud 35°, a = 6377304m dan b = 6356102 m. (Berikan jawapan anda dalam km).

[15 marks]
[*15 markah*]

SECTION B: 50 MARKS

BAHAGIAN B: 50 MARKAH

INSTRUCTION:

This section consists of **FOUR (4)** structured essay questions. Answer **TWO (2)** questions only.

ARAHAN:

*Bahagian ini mengandungi **EMPAT (4)** soalan esei berstruktur. Jawab **DUA (2)** soalan sahaja.*

QUESTION 1

SOALAN 1

CLO1
C1

(a) Define the meaning of geoid surface.
Takrifkan maksud permukaan geoid.

[5 marks]
[*5 markah*]

CLO1
C2

(b) Explain the reference surface of ellipsoid.
Terangkan permukaan rujukan elipsoid.

[5 marks]
[*5 markah*]

CLO1
C3

(c) The relationship between reference surfaces in geodesy can be determined by h = H + N. Use the suitable diagram to explain this formula clearly.
Hubungan antara permukaan –permukaan rujukan dalam geodesi boleh ditentukan dengan menggunakan h = H + N. Menggunakan gambarajah yang sesuai, terangkan formula tersebut dengan jelas.

[15 marks]
[*15 markah*]

QUESTION 2
SOALAN 2

CLO1 C1 (a) From the basic characteristic of an ellipse, two types of curve radius on an ellipsoid are formed. Based on the statement, sketch the suitable diagram and define the meaning of Prime Vertical radius of curvature.
Dari ciri asas sesuatu elips, dua jenis jejari kelengkungan pada elipsoid dapat dihasilkan. Berdasarkan pernyataan tersebut, lukiskan gambarajah yang sesuai dan definisikan maksud Jejari Kelengkungan pada Pugak Utama

[5 marks]
[*5 markah*]

CLO1 C2 (b) Based on given data in Table B2(b) below, compute the value of flattening, f.
Berdasarkan data yang diberikan dalam Jadual B2(b) di bawah , kirakan nilai kepesekan , f.

Table B2(b) / *Jadual B2(b)*

Parameter	Value
a	6377276.345 m
b	6358100.155 m

[5 marks]
[*5 markah*]

CLO1 C3 (c) Sketch the suitable diagram and explain the following terms:
Lakarkan gambarajah yang sesuai serta terangkan istilah-istilah berikut:

i. Geodesic Line.
Garisan Geodesik.

[5 marks]
[*5 markah*]

ii. Normal Section Curve.
Lengkung Keratan Normal.

[5 marks]
[*5 markah*]

iii. Spherical Excess.
Lebihan Sfera.

[5 marks]
[*5 markah*]

QUESTION 3
SOALAN 3

CLO2 C1 (a) Draw suitable diagram and define the meaning of Laplace Station in geodetic network.
Lukiskan rajah yang sesuai dan takrifkan maksud Stesen Laplace dalam rangkaian kerja geodetik.

[5 marks]
[*5 markah*]

CLO2 C2 (b) Differentiate between astronomical longitude and geodetic longitude.
Bezakan antara longitud astronomi dengan longitud geodetik.

[5 marks]
[*5 markah*]

CLO2 C3 (c) Discuss the process in reduction of data observation on the ellipsoid:
Bincangkan proses penurunan data cerapan di atas elipsoid:

i. The data reduction of distance observation.
Penurunan data cerapan jarak.

[8 marks]
[*8 markah*]

ii. The data reduction of azimuth (directions) observation.
Penurunan data cerapan azimuth (arah).

[7 marks]
[*7 markah*]

QUESTION 4

SOALAN 4

CLO2 C1 (a) State the condition that categorizes a geodetic problem as an inverse problem.
Nyatakan keadaan yang mengkategorikan masalah geodetik sebagai masalah songsang.

[5 marks]
[*5 markah*]

CLO2 C2 (b) Based on given data in Table B4(b), compute value of Prime Vertical radius of curvature, γ_m at latitude 35°.
Berdasarkan data yang diberikan dalam Jadual B4(b), kirakan nilai jejarikelengkungan pada Pugak Utama, γ_m pada latitud 35°.

Table B4(b) / *Jadual B4(b)*

Parameter/ *Parameter*	**Value/ *Nilai***
a	63783500
e^2	0.0815425
Formula, γ_m	$\frac{a}{(1-e^2 \sin^2 \Phi)^{1/2}}$

[5 marks]
[*5 markah*]

CLO2
C3

(c) Position of station A and ellipsoid parameters are given in Table B4(c). By using the mid-latitude method, calculate the position of station B.
Kedudukan stesen A parameter elipsoid diberikan dalam Jadual B4(c). Menggunakan kaedah latitud-tengah, dapatkan kedudukan stesen B.

Table B4(c) */ Jadual B4(c)*

Station A/ *Stesen A*	$\Phi A = 25° 12' 20"$ N
	$\lambda A = 18° 20' 10"$ E
Ellipsoid Parameter	a= 6 378 000 m
	$e^2 = 0.0067220$ m
Ellipsoidal Distance AB	17716.765 m
Azimuth AB, αAB	48° 40' 08"
Meridian radius of curvature, ρ_m	6346729.687 m
Prime vertical radius of curvature, γ_m	6381891.333 m

[15 marks]
[*15 markah*]

SOALAN TAMAT

FORMULA

$\Delta\lambda_{AB} = \lambda_B - \lambda_A$

$\Delta\phi_{AB} = \phi_B - \phi_A$

$\phi_m = \frac{\phi_A + \phi_B}{2}$

$\tan\alpha_m = \frac{\Delta\lambda\ \gamma m \cos\phi_m}{\Delta\phi\ \rho m}$

$\tan\frac{\Delta\alpha}{2} = \tan\frac{\Delta\lambda}{2} \times \sin\phi_m \times \sec\frac{\Delta\phi}{2}$

$\alpha_{AB} = \alpha_m \pm \frac{\Delta\alpha}{2}$

α_{BA} $\alpha_{AB} + \Delta\alpha \pm 180°$

$S = \frac{\rho m\ \sin 1''\ \Delta\phi''}{\cos\alpha_{AB}}$

$X = (N + h)\cos\phi\ \cos\lambda$

$Y = (N + h)\cos\phi\ \sin\lambda$

$Z = [N(1-e^2) + h]\sin\phi$

$N = \frac{a}{(1 - e^2\ sin^2\phi)^{1/2}}$

$tan\ \phi = \frac{Z}{\sqrt{(1-e^2)(X^2 + Y^2)}}$

$\phi = tan^{-1}\left[\frac{Z}{(1-e^2)(X^2+Y^2)^{\frac{1}{2}}}\right]$

$\tan\lambda = \frac{Y}{X}$

$\lambda = tan^{-1}\left[\frac{Y}{X}\right]$

$h = \frac{Z}{\sin\phi} - N\ (1 - e^2)$

	North	South
East	-Δα	+Δα
West	+Δα	-Δα

$\Delta\phi''$

$\phi_m = \phi_A + \frac{\Delta\phi}{2}$

$\Delta\lambda'' = \frac{S \sin\ \alpha_{AB}}{\gamma_m\ cos\ \phi_m \sin 1''}$

$\phi_B = \phi_A + \Delta\phi$

$\lambda_B = \lambda_A + \Delta\lambda$

$\gamma m = \frac{a}{(1 - e^2 sin^2\phi_m)^{\frac{1}{2}}}$