POLITEKNIK
MALAYSIA

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN TINGGI

JABATAN KEJURUTERAAN AWAM

PEPERIKSAAN AKHIR

SESI JUN 2016

DCC3093: ENGINEERING SURVEY 2

TARIKH   : 28 OKTOBER 2016
MASA   : 8.30 AM - 10.30 AM (2 JAM)

Kertas ini mengandungi **SEMBILAN (9)** halaman bercetak.
Bahagian A: Struktur (2 soalan)
Bahagian B: Struktur (4 soalan)
Dokumen sokongan yang disertakan : Kertas Graf, Formula

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SECTION A: 50 MARKS

BAHAGIAN: 50 MARKAH

INSTRUCTION:

This section consists of **TWO (2)** structured questions. Answer **ALL** questions.

ARAHAN:

*Bahagian ini mengandungi **DUA (2)** soalan berstruktur. Jawab **SEMUA** soalan.*

QUESTION 1

SOALAN 1

CLO1
C2

(a)   Identify the suitable term for the circular curve of geometry as **Figure 1a**.

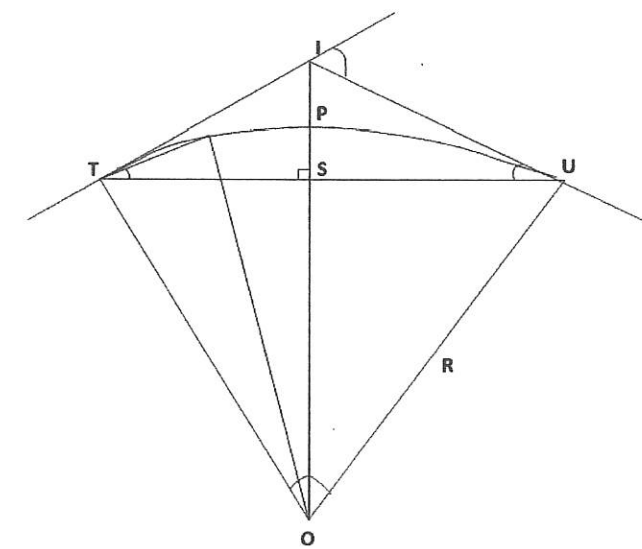*Kenalpasti istilah-istilah yang bersesuaian dengan geometri lengkungbulat seperti **Rajah 1a**.*

Figure 1a / *Rajah 1a*

i.   IT

ii.   PI

iii.   PS

iv.   O

[8 marks]
[8 markah]

CLO1
C3

(b) A curve is required to join two straight lines of a total deflection angle, Θ = 14° 44' 00" by a circular curve of 600m radius. Given chainage of Intersection Points, I is 2410.15m and its offset interval is 20m.Complete a setting out table of circular curve using deflection angle method.

Lengkung yang terdiri daripada dua garis lurus mempunyai sudut pesongan Θ = 14° 44' 00" dengan jejari 600m. Diberi titik jajaran bagi titik persilangan I ialah 2410.15m dan selang ofset ialah 20m. Lengkapkan jadual lengkungan dengan menggunakan kaedah sudut pesongan.

[17 marks]
[17 markah]

QUESTION 2
SOALAN 2

CLO1
C2

(a) Explain **FOUR (4)** general procedures of setting out.

*Terangkan **EMPAT(4)** tatacara am pemancangan tanda.*

[8 marks]
[8 markah]

CLO1
C3

(b) A 110 m long drainage water system is to be built with a slope of 1: 100 reduced from one point A to B. The reduced level for starting point A is 20.222 meters and point B is 20.195 meters. The invert level at the starting point of excavation of A is 19.123 meters. The length of the traveler is 3 meters. Calculate:

Satu sistem saluran air sepanjang 110 meter hendak dibina dengan kecerunan menurun 1: 100 dari satu titik A ke B. Aras laras titik permulaan pembinaan A ialah 20.222 meter dan titik B ialah 20.195 meter. Aras terbalik di titik permulaan penggalian A ialah 19.123 meter. Panjang rod pengembara ialah 3 meter. Kirakan:

i. Invert level at the end of point B.

Aras terbalik di titik akhiran B

[5 marks]
[5 markah]

ii. Height of sights rail needed to be set up on the ground of both A and B points.

Ketinggian rel aras yang perlu didirikan di atas tanah pada kedua-dua titik A dan B.

[6 marks]
[6 markah]

iii. The depth should be dug at points A and B.

Kedalaman yang perlu digali di titik A dan B.

[6 marks]
[6 markah]

SECTION B: 50 MARKS
BAHAGIAN B: 50 MARKAH

INSTRUCTION:
This section consists of **FOUR (4)** structured questions. Answer **TWO (2)** questions only.
ARAHAN:
Bahagian ini mengandungi EMPAT (4) soalan berstruktur. Jawab DUA (2) soalan sahaja.

QUESTION 1
SOALAN 1

CLO1
C1

(a)   List **FIVE (5)** different brands of Electronic Distance Measurement (EDM) available in the market.
      Senaraikan LIMA (5) jenama berlainan alat pengukuran elektronik (EDM) yang ada di pasaran.

[5 marks]
[5 markah]

CLO1
C2

(b)   Explain **TWO (2)** systems of Electronic Distance Measurement (EDM).
      Terangkan DUA (2) sistem dalam Pengukuran Jarak Elektronik (EDM)

[10 marks]
[10 markah]

CLO1
C3

(c)   Describe the basic principle of Electronic Distance Measurement (EDM) with the aid of illustration.
      Terangkan prinsip asas Pengukuran Jarak Elektronik (EDM) dengan bantuan lakaran.

[10 marks]
[10 markah]

QUESTION 2
SOALAN 2

CLO1
C1

(a)   State **TWO (2)** types of method in volume calculation with an appropriate formula
      Nyatakan DUA (2) kaedah dalam pengiraan isipadu dengan rumus penggiraan yang sesuai.

[5 marks]
[5 markah]

CLO1
C3

(b)   The values of the y ordinates of a curve and their distance x from the origin are given in the **Table 2(b)** below. Calculate the area under the curve by using the following methods;

CLO1
C3

Nilai-nilai ordinat lengkung y dan jarak x dari asalan diberikan dalam Jadual 2 b di bawah. Kirakan keluasan kawasan di bawah lengkung menggunakan kaedah – kaedah berikut;

Table 2(b) / *Jadual (2b)*

x	0	2	4	6	8	10	12
y	4	8	12	16	20	24	28

i.   Trapezoidal Rule
     Kaedah Trapezoidal

ii. Simpson Rule
     Kaedah Simpon

iii. Mid Ordinate Rule
     Kaedah Koordinat Pertengahan

[10 marks]
[10 markah]

CLO1
C3

(c)   **Table 2(c)** shows the data cubic contents of an embankment of which the cross section areas at 15 meter intervals. Calculate the volume using :

Jadual 2(c) menunjukkan kandungan isipadu tambakan di mana keratan rentas kawasan adalah pada sela 15 meter.Hitungkan isipadu menggunakan:

    i.   Prismoidal Methods
          Kaedah Prismoidal

    ii.   End Areas Methods
          Kaedah Keluasan Hujung

Table 2(c) / *Jadual 2(c)*

Distance(m) Jarak (m)	0	15	30	45	60	75	90
Area (m²) Keluasan(m²)	17	50	70	75	160	180	215

[10 marks]
[10 markah]

QUESTION 3
SOALAN 3

CLO1
C1

(a)   State the term used in Mass Haul Diagram:
Nyatakan istilah yang digunakan didalam gambarajah urungan padu;

    i. Balance Line
       Garisan keseimbangan   iii. Swell/Bulging

    ii. Waste   *Pengembangan*
       Sisa buangan

[3 marks]
[3 markah]

CLO1
C2

(b)   The data in **Table 3b** are from a roadway project starting from CH 0 to CH 800. If the shrinkage factor is 10%, calculate the cumulative volume.

*Data pada **Jadual 3b** diperolehi daripada satu projek jalanraya dari rantaian CH 0 hingga CH 800. Jika diberi faktor pengecutan adalah 10%, kirakan isipadu tanah kelompok*

Table 3b/ Jadual 3b

Chainage (m) Rantaian (m)	Cut (m³) Isipadu korekan (m³)	Fill (m³) Isipadu Timbusan (m³)
0		0
100		15000
200		20000
300	60000	
400	12000	
500	32000	
600		6520
700		8100
800		11200

[10 marks]
[10 markah]

CLO1
C3

(b)   i. Plot a Mass Haul Diagram by using data in **section b** with a suitable scale.
*Plot graf gambarajah urungan padu dengan menggunakan data **seksyen b** dan skala yang bersesuaian.*

[12 marks]
[12 markah]

QUESTION 4
SOALAN 4

CLO1
C1

(a)   Draw **THREE (3)** types of circular curve.

*Lukis **TIGA (3)** jenis lengkung bulat.*

[3 marks]

[3 markah]

CLO1
C2

(b)   With the aid of a diagram, explain **FIVE (5)** terminologies used to describe a circular curve.

*Dengan bantuan gambarajah, terangkan **LIMA (5)** istilah yang digunakan untuk menggambarkan lengkung bulat.*

[10 marks]

[10 markah]

CLO1
C3

(c)   A circular curve of 500 m radius is connecting two straight roads, which intersect with an angle of 14° 00' 20". During the design of the curve, the chainage of intersection point is 3500.00 m.

Calculate the data of deflection angle method for setting out circular curve at 22 m interval.

Satu lengkung bulat berjejari 500 m menyambungkan antara dua jalan yang lurus, bersilang dengan sudut 14 ° 00' 20". Semasa rekabentuk lengkung dilakukan, rantaian titik persilangan adalah pada 3500.00 m.

Kirakan data pemancangan dengan kaedah untuk penjajaran lengkungan bulat pada sela 22 m.

[12 marks]

[12 markah]

SOALAN TAMAT

FORMULA DCC3093 – ENGINEERING SURVEY 2

AREA AND VOLUME

i.   Area = $\sqrt{[S(S-a)(S-b)(S-c)]}$ where $S = \frac{1}{2}(a+b+c)$

ii.   Area = $\frac{1}{2}(b \times h)$

iii.   Area = $\frac{1}{2}(a \times b \times \sin c)$

iv.   Area = $(a \times b)$

v.   Area = $\frac{1}{2}(a+b) \times h$

Trapezoidal rule $= \frac{D}{2}\left(O_1 + O_n + 2\sum O_{of\,.remaining.ordinate}\right)$

Mid ordinate rule = D (sum of mid-ordinate)

Simpson Rule $= \frac{D}{3}(O_1 + O_n + 4\sum even.ordinate + 2\sum odd.ordinate)$

Cross Sectional Area

$$= h(b+sh)$$
$$= \frac{1}{2}m\left[\left(\frac{b}{2}+mh\right)(w_1+w_2)-\frac{b^2}{2}\right]$$
$$= \frac{1}{2}\left[\left(\frac{b}{2}+kh\right)^2/(k-m)\right] \& = \frac{1}{2}\left[\left(\frac{b}{2}-kh\right)^2/(k-n)\right]$$
$$= \frac{1}{2}m\left[(w_1+w_2)\left(mh+\frac{b}{2}\right)-\frac{b^2}{2}\right]$$

MASS HAUL DIAGRAM

$$Haul = \frac{Haul.volume \times average.haul.\text{distance}}{100} stn.m$$

$$Freehaul = \frac{Freehaul.volume \times freehaul.\text{distance}}{100} stn.m$$

$$Overhaul = \frac{Overhaul.volume(average.overhaul.\text{distance} - freehaul.\text{distance})}{100} stn.m$$

CURVE

Tangent length $= R \tan \frac{\theta}{2}$

Long chord length $= 2R \sin \frac{\theta}{2}$

Arc length $= \pi \times R \times \dfrac{\theta}{180}$ @ $= 2\pi \times R \times \dfrac{\theta}{360}$

Chainage T_1 = Chainage I – tangent length

Chainage T_2 = Chainage T_1 + arc length

Offset from tangent line , $X = R - \sqrt{\left(R^2 - Y^2\right)}$

Offset from long chord line, $X = \sqrt{\left(R^2 - Y^2\right)} - \sqrt{\left(R^2 - \left(\frac{W}{2}\right)^2\right)}$

Deflection angle method $\delta_{I(xxx)} = \dfrac{1718.9 \times C}{60R}$ @ $\delta_{I(xxx)} = \dfrac{1718.9 \times C}{R}$

Sub chords line method

$$Ofset_1 = \frac{a^2}{2R} \quad Ofset_2 = \frac{b(b+a)}{2R} \quad Ofset_{eithers} = \frac{b^2}{R} \quad Ofset_n = \frac{c(b+c)}{2R}$$

Setting out transition curves $= \dfrac{573 I^2}{60RL}$

Length of transition curve $= \dfrac{V^3}{3.6^3} Cr$

Shift of Cubic Parabola $= L^2/24R$

Length of Tangent Spiral angle $= (R + S)\tan\frac{\theta}{2} + \frac{L}{2}$ @ $= \frac{L}{2R}(180/\pi)$

Vertical Curves ; $RL = RL_{T2} + \left[\left(\frac{my}{100}\right) - \left(\frac{Ay^2}{200L}\right)\right]$

i. $A = m - n$

ii. Length of vertical curves = KA

iii. Chainage T_1 = Chainage I - $L/2$

iv. Chainage T_2 = Chainage I + $L/2$

v. Difference of height $_m$ = $mL/200$

vi. Reduced Level T_2 = RL_1 - Δh_m

vii. $Y_{max/min}$ = Lm/A

viii. Reduced Level max/min =
$RLT_1 + \left(Lm^2/200A\right)$