

SULIT



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

JABATAN KEJURUTERAAN AWAM

PEPERIKSAAN AKHIR

SESI JUN 2017

DCC3093: ENGINEERING SURVEY 2

TARIKH : 22 OKTOBER 2017

MASA : 8.30PAGI – 10.30PAGI

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

Bahagian A: Soalan Struktur (2 soalan)

Bahagian B: Soalan Struktur (4 soalan)

Dokumen sokongan yang disertakan : Formula

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SULIT

SECTION A: 50 MARKS**BAHAGIAN A: 50 MARKAH****INSTRUCTION:**

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

ARAHAN:

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

QUESTION 1**SOALAN 1**

CLO1
C2

- (a) Explain by sketching a diagram **FOUR (4)** elements of a simple circular curve.

Terangkan dengan lakaran gambarajah EMPAT(4) elemen lengkung mudah.

[8 marks]

[8 markah]

CLO1
C3

- (b) Two straight lines A1 and B1 meet at chainage of 4350m. A simple circular curve of 200m radius joins them and the deflection angle between the two straight lines is 50°. If the chord interval is 35m, calculate the data needed to design the curve using Deflection Angle Method.

Dua laluan lurus A1 dan B1 bertemu di rantaian 4350meter. Satu lengkung bulat berjejari 200m menghubungkan kedua-duanya dan sudut pesongan antara dua laluan lurus tersebut adalah 50°. Jika sela jarak yang digunakan adalah 35m, kirakan data yang diperlukan untuk pemancangan lengkung tersebut 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 point A to B. The reduced level for starting point A is 20.222 meter and point B is 20.195 meter. The invert level at the starting point of excavation of A is 19.123 meter. The length of the traveler is 3 meter. Calculate the following:

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

- i. Invert level at the end of point B.

Aras terbalik di titik akhiran B.

[5 marks]

[5markah]

- ii. Height of sight 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]

[6markah]

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

Kedalaman yang perlu digali di titik A dan B.

[6 marks]

[6markah]

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 briefly **TWO (2)** types of systems used in Electronic Distance Measurement (EDM) instrument.

Terangkan dengan ringkas DUA (2) jenis sistem yang digunakan dalam peralatan Pengukuran Jarak Elektronik (EDM).

[10 marks]

[10 markah]

CLO1
C3

- (c) Carry out 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) Define;

Takrifkan;

i. Rectilinear areas

Luas dibatasi oleh garis lurus

ii. Irregular areas

Luas yang dibatasi oleh garis tidak lurus.

[5 marks]

[5 markah]

CLO1
C3(b) According to **Figure 2(b)** below, calculate the total area involved using **Simpson Method**. Given $AB = 23\text{m}$ and $CA = 26\text{m}$.*Berdasarkan Rajah 2(b) di bawah, kirakan jumlah luas dengan menggunakan Kaedah Simpson. Diberi $AB = 23\text{m}$ dan $CA = 26\text{m}$.*

[10 marks]

[10 markah]

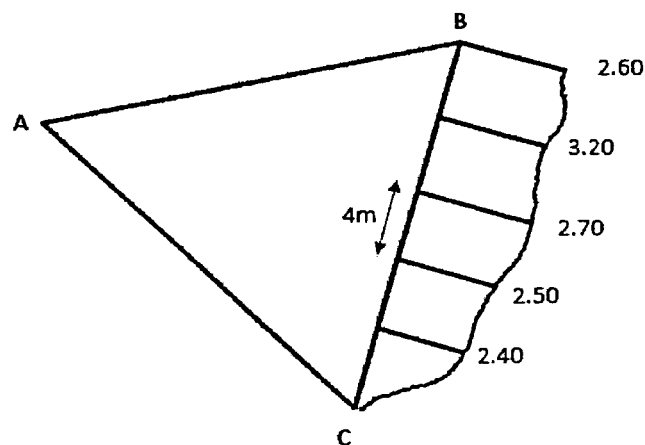


Figure 2(b) / Rajah 2 (b)

CLO1
C3

- (c) **Figure 2(c)** shows a grid of plot which is to be excavated in uniform reduce level of 8.500m. Using triangle method, calculate the average reduce level and volume of earth to be excavated.

Rajah 2(c) menunjukkan plot yang akan dikorek pada aras laras 8.500m. Dengan menggunakan kaedah segitiga, kirakan aras laras purata dan isipadu tanah yang perlu dikorek.

[10 marks]

[10 markah]

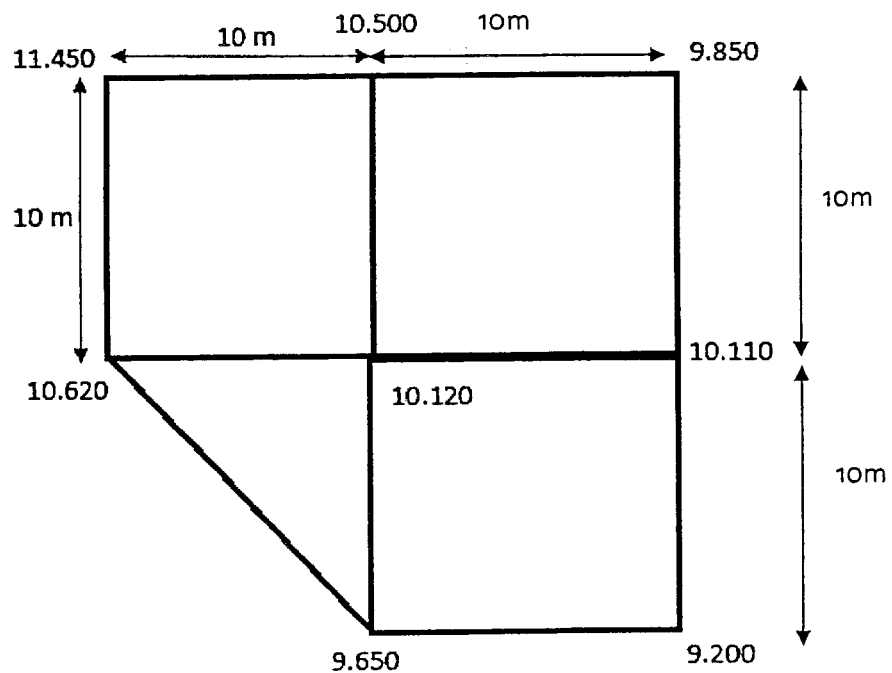


Figure 2(c) / Rajah 2 (c)

QUESTION 3
SOALAN 3

CLO1
C1

(a) Define:
Tarifkan:

- i. Balance Line
Garis Seimbang
- ii. Free Haul Distance
Jarak Angkut Percuma
- iii. Waste
Buangan

[3 marks]

[3 markah]

CLO1
C2

- i. Cut and fill is being applied in road construction works. Given the following cut and fill volume data in **Table 3(b)**. Compute the cumulative volume using shrinkage factor 0.1.

Korekan dan timbusan adalah aplikasi dalam kerja-kerja pembinaan jalanraya. Jadual 3(b) menunjukkan data korekan dan timbusan. Kira isipadu kumulatif dengan faktor susutan 0.1.

[10 marks]

[10 markah]

Table 3(b) / Jadual 3(b)

Chainage (m)	Volume of Cut	Volume of Fill
0	250	
25	720	
50	1640	
75	600	
100	120	
125		200
150		110
175		350
200		600
225		780
250	690	

CLO1
C3

- ii. By using the data calculated in Question 3(b), draw the Mass Haul Diagram with the proper scale. Calculate the followings:

Dengan menggunakan data kiraan Soalan 3(b), lukiskan Gambarajah Urungan Padu menggunakan skala yang sesuai. Kirakan yang berikut :

- i. Free Haul Volume
- i. *Isipadu Angkut Percuma*
- ii. Over Haul Volume
- ii. *Isipadu Angkut Lebih*
- iii. Average Over Haul Distance
- iii. *Jarak Purata Angkut Lebih*
- iv. Waste
- iv. *Buangan.*

Given Free Haul Distance = 125 m

Balance Line = 1500m^3

Diberi Jarak Angkut Percuma = 125m

Garis seimbang = 1500m^3

[12 marks]

[12 markah]

QUESTION 4

SOALAN 4

CLO1
C1

- (a) According to **Figure 4(a)** identify the missing component.
 Berdasarkan **Rajah 4(a)** lengkapkan komponen yang hilang.

[3 marks]

[3 markah]

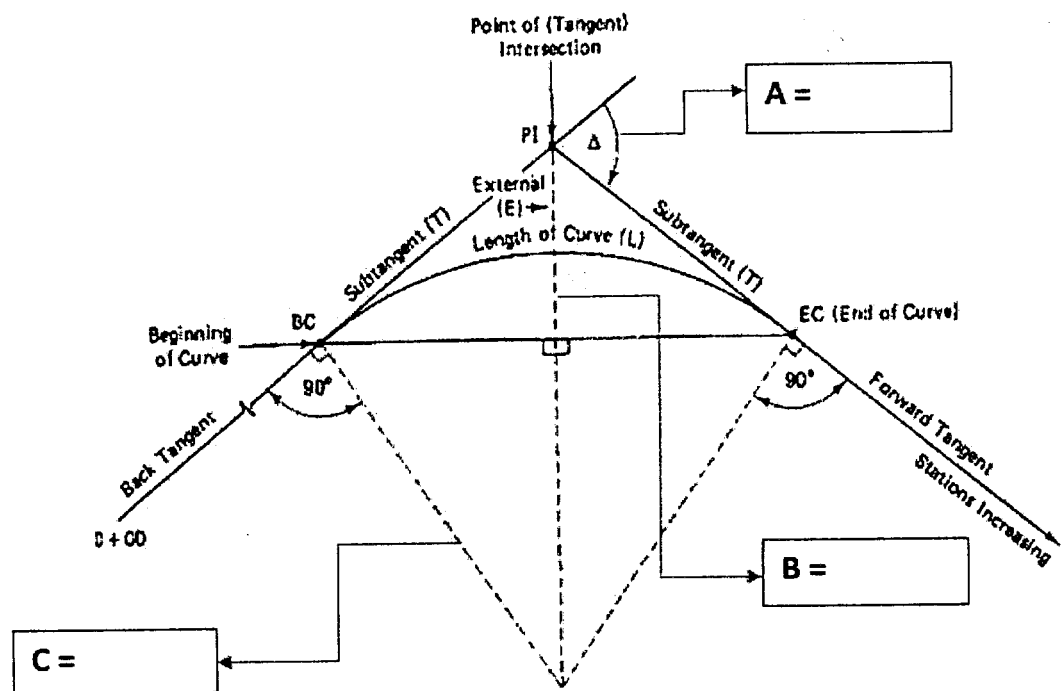


Figure 4(a) / Rajah 4(a)

CLO1
C2

- (b) Two straight lines which are intersecting at I with an angle of $48^{\circ} 00' 00''$ will be connected by a circular curve with radius of 450m. Given the chainage of the intersection point as 2212.80, calculate the tangent line, arc length, chainage T_1 and chainage T_2 needed to design the curve.

Dua garisan lurus bersilang di titik I dengan sudut pesongan $48^{\circ} 00' 00''$ akan dihubungkan dengan lengkung bulat dengan radius 450m. Diberi rantaian persilangan I ialah 2212.80, kirakan panjang tangen, panjang lengkung, rantaian T_1 dan rantaian T_2 untuk merekabentuk lengkung.

[10 marks]

[10 markah]

SULIT

CLO1
C3

- (c) By using data calculated in Question 4(b), calculate the data needed to design the circular curve using Deflection Angle Method. Given interval = 25m.

Dengan menggunakan data kiraan di Soalan 4(b), kirakan data yang perlu untuk rekabentuk penjajaran lengkung menggunakan Kaedah Sudut Pesongan. Diberi sela = 25m.

[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 = $\frac{1}{2}(a+b) \times h$

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

$$\text{Mid ordinate rule} = D (\text{sum of mid-ordinate})$$

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

Cross Sectional Area

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

MASS HAUL DIAGRAM

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

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

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

CURVE

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

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

$$\text{Arc length} = \pi \times R \times \frac{\theta}{180} \quad @ \quad = 2\pi \times R \times \frac{\theta}{360}$$

$$\text{Chainage } T_1 = \text{Chainage } I - \text{tangent length}$$

$$\text{Chainage } T_2 = \text{Chainage } T_1 + \text{arc length}$$

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

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

$$\text{Deflection angle method} \quad \delta_{I(XXX)} = \frac{1718.9 \times C}{60R} \quad @ \quad \delta_{I(XXX)} = \frac{1718.9 \times C}{R}$$

Sub chords line method

$$\text{Offset}_1 = \frac{a^2}{2R} \quad \text{Offset}_2 = \frac{b(b+a)}{2R} \quad \text{Offset}_{\text{either}} = \frac{b^2}{R} \quad \text{Offset}_n = \frac{c(b+c)}{2R}$$

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

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

$$\text{Shift of Cubic Parabola} = L^2 / 24R$$

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

$$\text{Vertical Curves ;} \quad RL = RL_{T_2} + \left[\left(\frac{my}{100} \right) - \left(\frac{Ay^2}{200L} \right) \right]$$

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 $T_2 = RL_1 - \Delta h_m$

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

viii. Reduced Level max/min =
 $RL_{T_1} + (Lm^2/200A)$