

SULIT

7



BAHAGIAN PEPERIKSAAN DAN PENILAIAN  
JABATAN PENDIDIKAN POLITEKNIK  
KEMENTERIAN PENDIDIKAN TINGGI

JABATAN KEJURUTERAAN AWAM

PEPERIKSAAN AKHIR  
SESI JUN 2017

**DCC3093: ENGINEERING SURVEY 2**

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**TARIKH : 22 OKTOBER 2017**  
**MASA : 8.30PAGI – 10.30PAGI**

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Kertas ini mengandungi **SEPULUH (10)** halaman bercetak.  
Bahagian A: Soalan Struktur (2 soalan)  
Bahagian B: Soalan Struktur (4 soalan)  
Dokumen sokongan yang disertakan : Formula

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**JANGAN BUKA KERTAS SOALANINI 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  $50^\circ$ . 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  $50^\circ$ . 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. Rectiliner areas

*Luas dibatasi oleh garis lurus*

- ii. Irregular areas

*Luas yang dibatasi oleh garis tidak lurus.*

[5 marks]

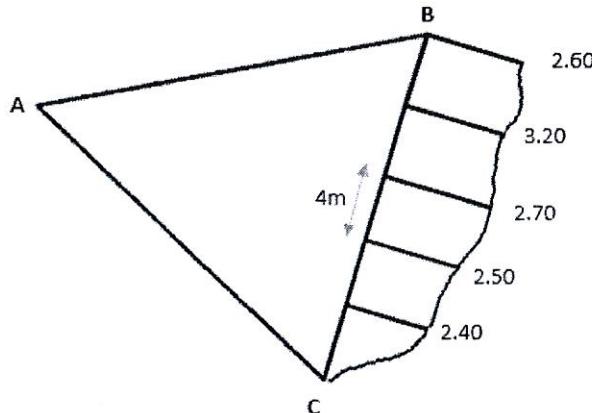
[5 markah]

CLO1  
C3

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

[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]

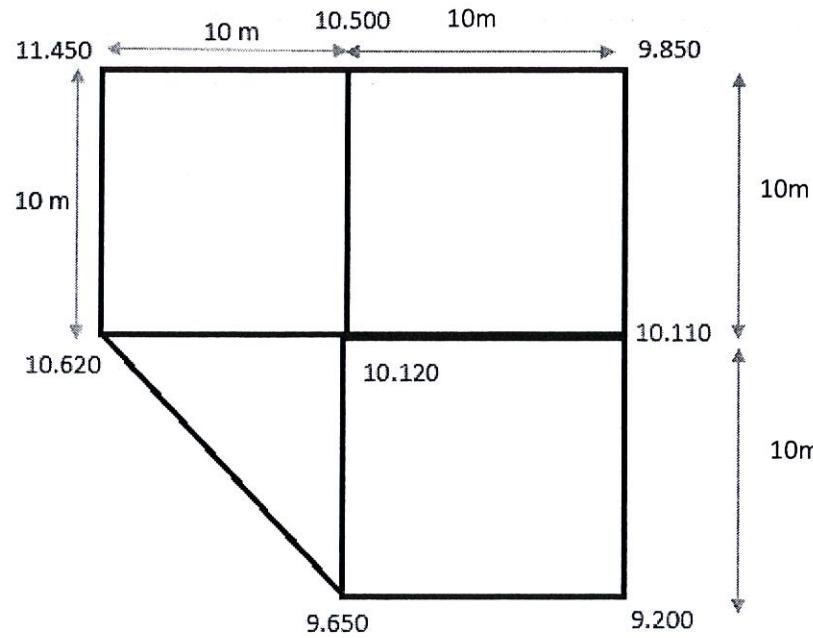


Figure 2(c) / Rajah 2 (c)

**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]

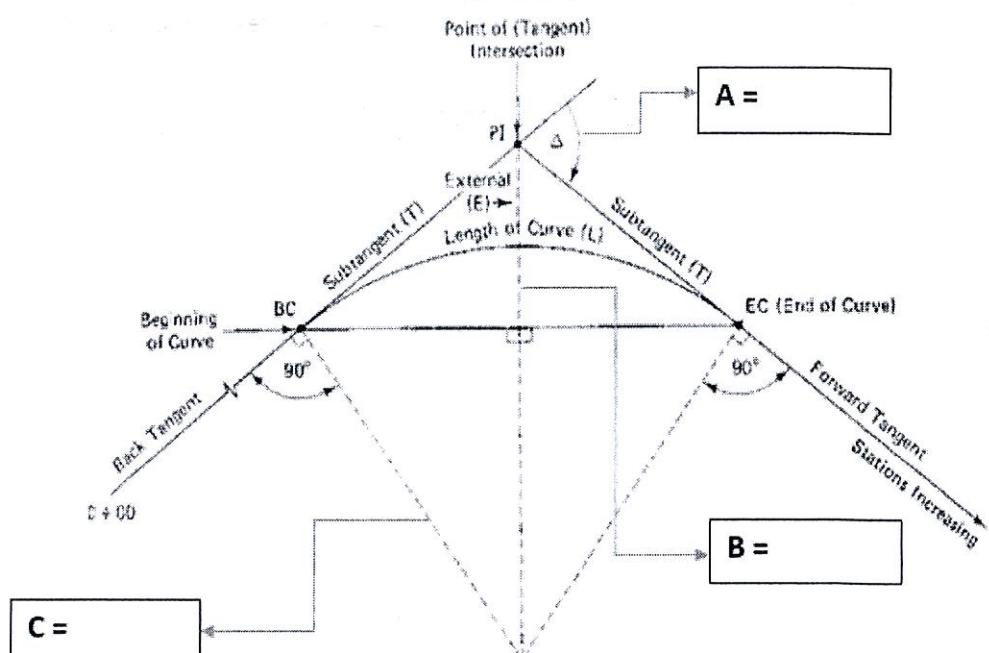
[12 markah]

**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.*

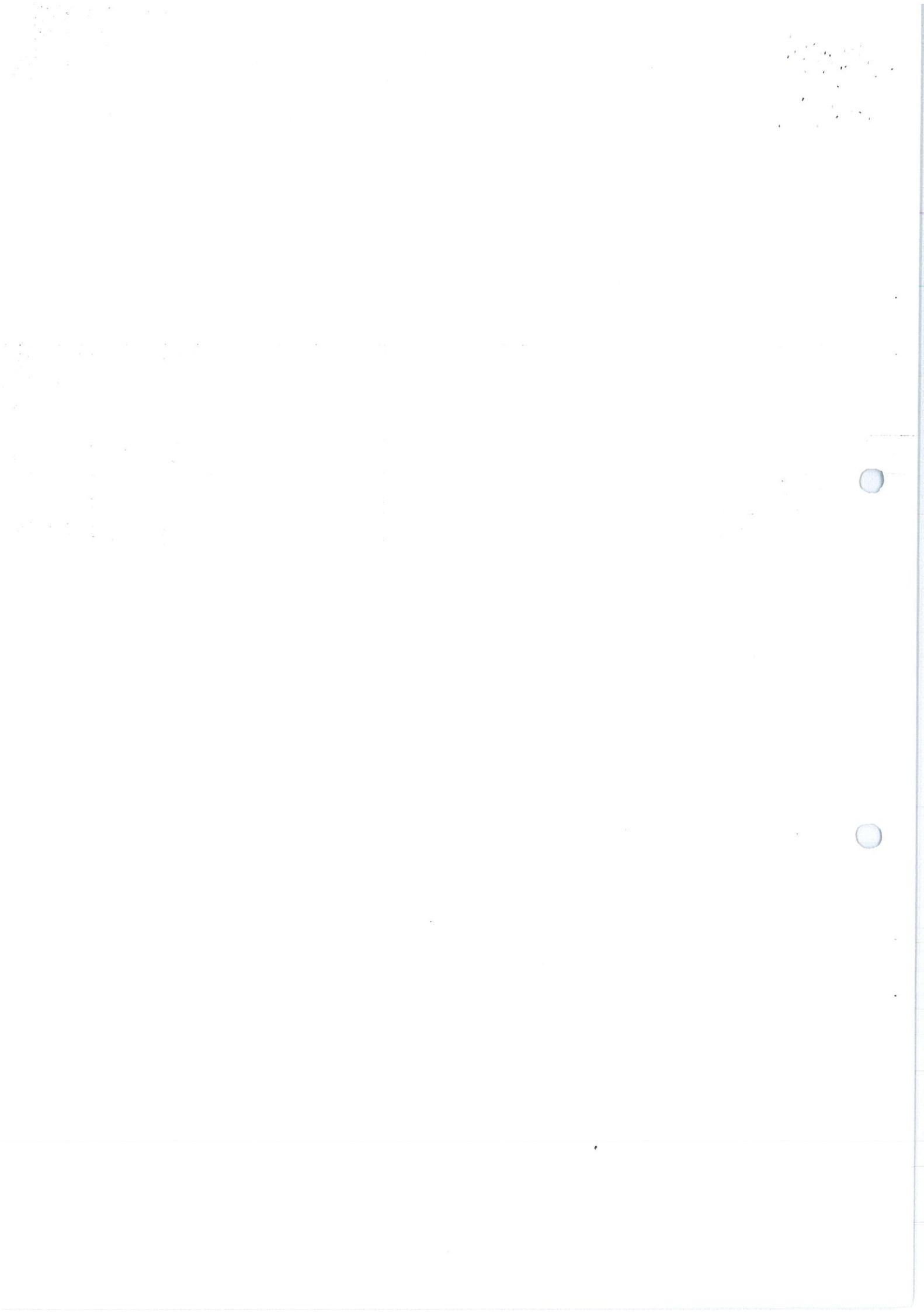
[10 marks]

CLO1  
C3*[10 markah]*

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

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

Mid ordinate rule = D ( 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

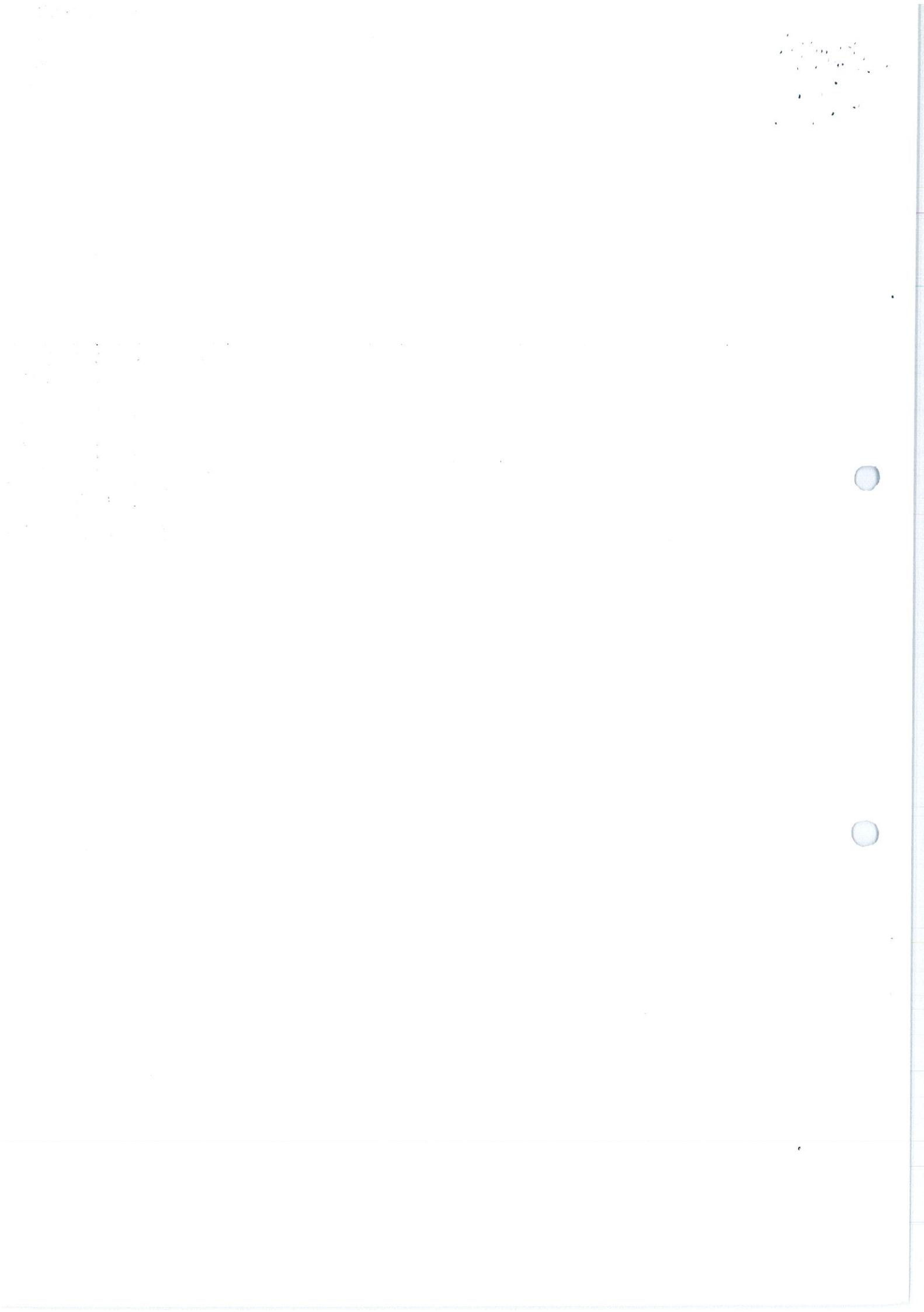
$$\begin{aligned} &= h(b + sh) \\ &= \frac{1}{2}m\left[\left(\frac{b}{2} + mh\right)(w_1 + w_2) - \frac{b^2}{2}\right] \\ &= \frac{1}{2}\left[\left(\frac{b}{2} + kh\right)^2/(k-m)\right] \&= \frac{1}{2}\left[\left(\frac{b}{2} - kh\right)^2/(k-n)\right] \\ &= \frac{1}{2}m\left[(w_1 + w_2)\left(mh + \frac{b}{2}\right)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

### MASS HAUL DIAGRAM

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

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

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



## CURVE

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

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

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

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

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

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

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

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

Sub chords line method

$$Offset_1 = \frac{a^2}{2R} \quad Offset_2 = \frac{b(b+a)}{2R} \quad Offset_{\text{either}} = \frac{b^2}{R} \quad Offset_n = \frac{c(b+c)}{2R}$$

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

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

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

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

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

- |      |   |       |   |
|------|---|-------|---|
| i.   | $A = m - n$                               | v.    | Difference of height $m = mL/200$             |
| ii.  | Length of vertical curves = KA            | vi.   | Reduced Level $T_2 = RL_1 - \Delta h_m$       |
| iii. | Chainage $T_1 = \text{Chainage } I - L/2$ | vii.  | $Y_{\max/\min} = Lm/A$                        |
| iv.  | Chainage $T_2 = \text{Chainage } I + L/2$ | viii. | Reduced Level max/min = $RLT_1 + (Lm^2/200A)$ |

