

SULIT



BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN TINGGI

JABATAN KEJURUTERAAN AWAM

PEPERIKSAAN AKHIR
SESI JUN 2016

DCC3093: ENGINEERING SURVEY

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)

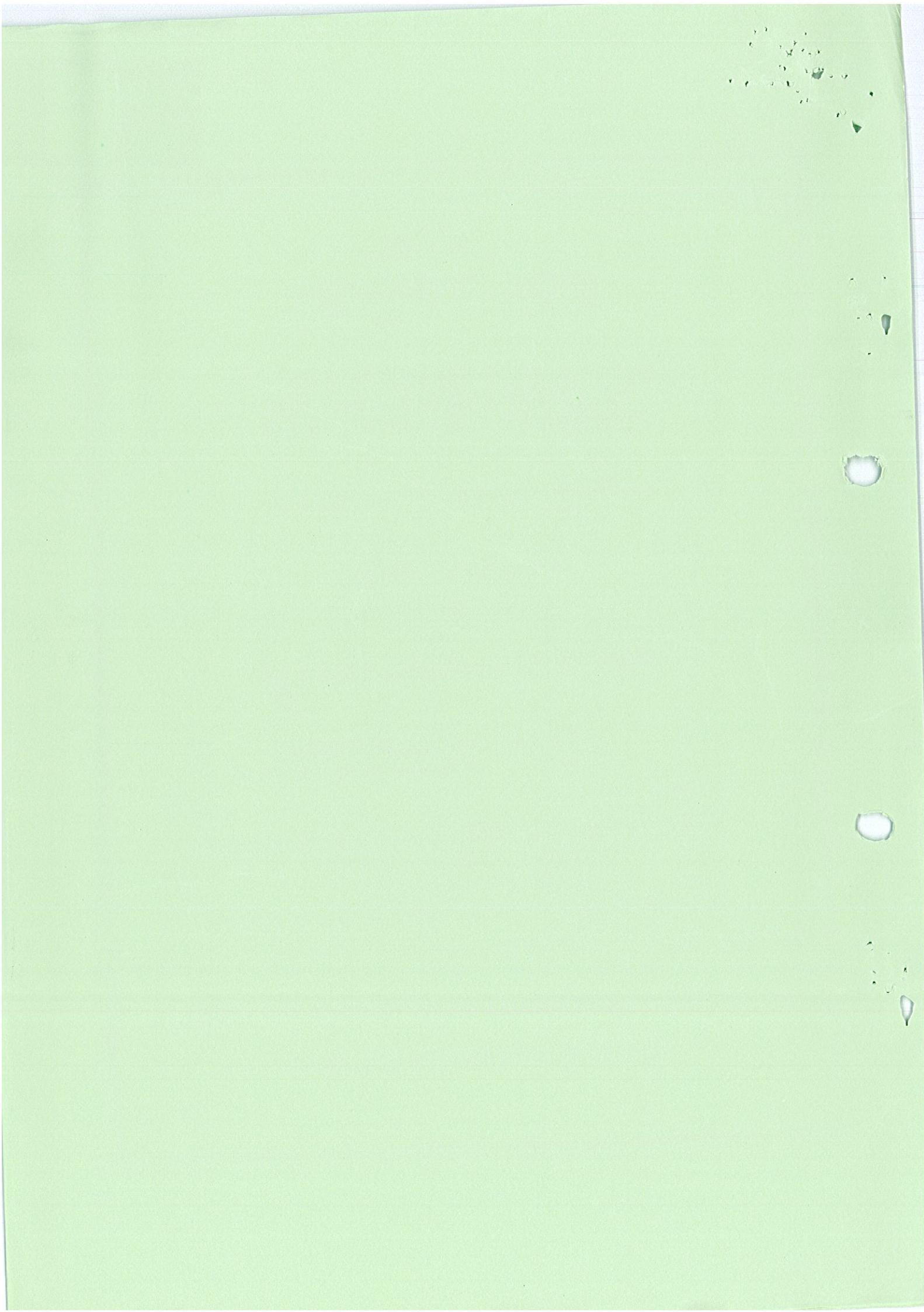
Bahagian B: Struktur (4 soalan)

Dokumen sokongan yang disertakan : Kertas Graf, Formula

JANGAN BUKA KERTAS SOALANINI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SULIT



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.

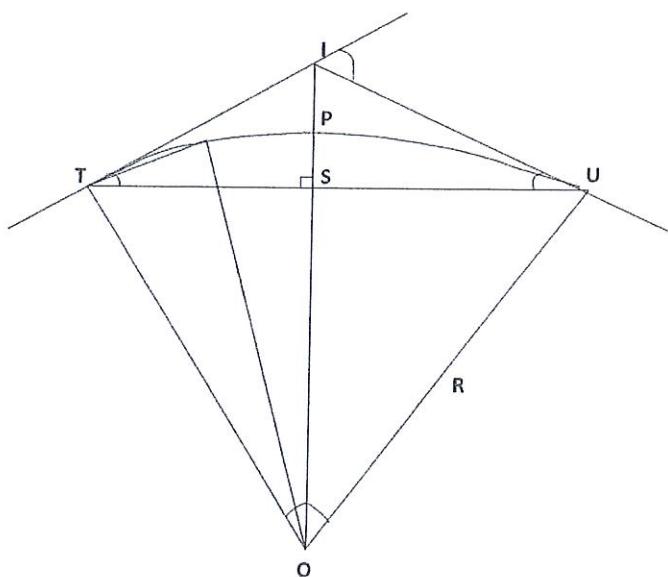


Figure 1a / Rajah 1a

- 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, $\Theta = 14^\circ 44' 00''$ 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 $\Theta = 14^\circ 44' 00''$ 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.

ARAHAH:

*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 pengiraan 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 (m^2) Keluasan(m^2)	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 (m^3) Isipadu korekan (m^3)	Fill (m^3) Isipadu Timbusan (m^3)
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 $14^{\circ} 00' 20''$. 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 $14^{\circ} 00' 20''$. 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. $\text{Area} = \sqrt{[S(S-a)(S-b)(S-c)]}$ where $S = \frac{1}{2}(a+b+c)$
- ii. $\text{Area} = \frac{1}{2}(b \times h)$
- iii. $\text{Area} = \frac{1}{2}(a \times b \times \sin c)$
- iv. $\text{Area} = (a \times b)$
- v. $\text{Area} = \frac{1}{2}(a+b) \times h$

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

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

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

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

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

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

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

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

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

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

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

Sub chords line method

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

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

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

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

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

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

i. $A = m - n$

ii. Length of vertical curves = KA

iii. Chainage $T_1 = \text{Chainage I} - L/2$

iv. Chainage $T_2 = \text{Chainage I} + L/2$

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 = $RLT_1 + (Lm^2/200A)$