POLITEKNIK
MALAYSIA

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI
KEMENTERIAN PENDIDIKAN MALAYSIA

JABATAN KEJURUTERAAN AWAM

PEPERIKSAAN AKHIR

SESI JUN 2018

DCC3093 : ENGINEERING SURVEY 2

TARIKH : 14 NOVEMBER 2018
MASA : 8.30 PAGI – 10.30 PAGI (2 JAM)

Kertas ini mengandungi TIGA BELAS (13) halaman bercetak.
Bahagian A: Struktur (2 soalan)
Bahagian B: Struktur (4 soalan)
Dokumen sokongan yang disertakan : Kertas Graf dan 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 questions. Answer **ALL** questions.

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

QUESTION 1
SOALAN 1

CLO1
C2

(a) With the aid of a diagram, identify **FOUR (4)** terms of curve ranging setting out.

Dengan bantuan gambarajah, kenal pasti EMPAT (4) terma bagi pemancangan

penjajaran lengkung.

[8 marks]

[*8 markah*]

CLO1
C3

(b) **Table A1** shows information of curve ranging setting out conducted by Sabak Bernam District Councils contractor.

Jadual A1 menunjukkan maklumat pemancangan penjajaran lengkung yang

dilaksanakan oleh kontraktor Majlis Daerah Sabak Bernam.

Table A1/ *Jadual A1*

Information *Maklumat*	Value *Nilai*
Radius, R *Jejari*	260 m
Deflection angle connect two straight routes, Θ *Sudut pesongan yang menghubungkan dua laluan lurus*	20°30′00″.
Chainage of Intersection points *Rantaian titik persilangan*	20000.00m

As an Engineer Assistant, you are directed to calculate:

Sebagai Pembantu Jurutera, kamu diarahkan untuk mengira:

i. The length of tangent line;

   Panjang garis tangen;

[2 marks]

[2 *markah*]

ii. Chainage of T1;

   Rantaian T1;

[2 marks]

[2 *markah*]

iii. Length of curve;

   Panjang lengkung;

[2 marks]

[2 *markah*]

iv. Chainage of T2;

   Rantaian T2;

[2 marks]

[2 *markah*]

v. Long chord;

   Garis rentas terpanjang;

[2 marks]

[2 *markah*]

vi. Calculate all setting out data using offset method from long chord. Use interval value, 8m.

   Kirakan semua data penjajaran lengkung dengan kaedah offset dari garis rentas panjang. Gunakan nilai sela, 8m.

[7 marks]

[7 *markah*]

QUESTION 2
SOALAN 2

CLO1
C2

(a) Describe the usage of a traveler rod for setting out trench excavation works using a suitable diagram.

Terangkan penggunaan rod pengembara untuk penandaan kerja penggalian parit dengan menggunakan gambarajah yang sesuai.

[8 marks]
[8 *markah*]

CLO1
C3

(b) An 275 m long pipeline to be built with a slope of 1: 1375 reduced from one point A to B. Reduced level for starting point at point A is 15.111 meters and point B is 15.106 meters. Invert level at the start of excavation of A is 14.505 meters. The length of the boning rod/ traveler is 2 meters. Calculate:

Satu sistem saluran paip sepanjang 275 meter hendak dibina dengan kecerunan menurun 1: 1375 dari satu titik A ke B. Aras laras titik permulaan pembinaan titik A ialah 15.111 meter dan titik B ialah 15.106 meter. Aras terbalik di titik permulaan penggalian A ialah 14.505 meter. Panjang rod aras/ pengembara ialah 2 meter. Hitungkan:

i. Invert level at the end of point B.
    Aras terbalik di titik akhiran B.

[5 marks]
[5 *markah*]

ii. The depth of excavation at points A and B.

Kedalaman penggalian di titik A dan B.

[6 marks]

[6 *markah*]

iii. Height of sights rail at point A and B.

Ketinggian rel aras pada 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** questions only.

ARAHAN:
*Bahagian ini mengandungi **EMPAT (4)** soalan berstruktur. Jawab **DUA** soalan sahaja.*

QUESTION 1
SOALAN 1

CLO1
C1

(a) List **FIVE (5)** instruments used to measure the distance electronically that are available in the market.

*Senaraikan **LIMA (5)** peralatan yang digunakan untuk mengukur jarak secara elektonik yang ada di pasaran.*

[5 marks]
[5 *markah*]

CLO1
C2

(b) Explain briefly **FIVE (5)** usages of Electronic Distance Measurement (EDM) in engineering fields.

*Terangkan dengan ringkas **LIMA (5)** kegunaan Pengukuran Jarak Elektronik (EDM) dalam bidang kejuruteraan.*

[10 marks]
[*10markah*]

SULIT

CLO1
C3

(c) **Figure B1** below shows Royal Belum Bridge located at Grik, Perak. Based on a data that has been observed using EDM, calculate horizontal distance A to D.

Rajah B1 di bawah menunjukkan Jambatan Royal Belum yang terletak di Grik, Perak. Berdasarkan data yang telah dicerap menggunakan EDM, kirakan panjang mendatar dari A ke D.
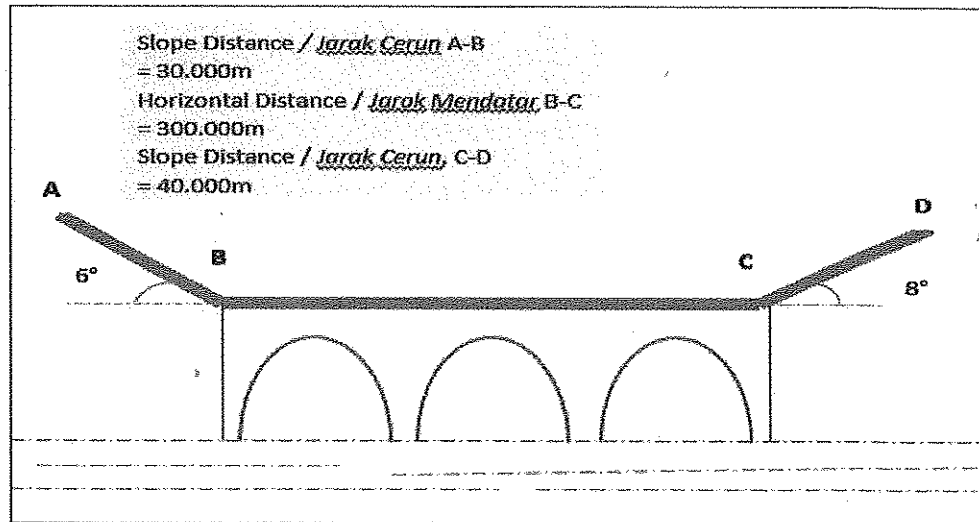

Slope Distance / *Jarak Cerun* A-B
= 30.000m
Horizontal Distance / *Jarak Mendatar* B-C
= 300.000m
Slope Distance / *Jarak Cerun*, C-D
= 40.000m

Figure B1/ *Rajah B1*

[10 marks]
[*10 markah*]

QUESTION 2
SOALAN 2

CLO1
C1

(a) State **TWO (2)** characteristics of Trapezoidal Rule for computation of area enclosed by irregular line. Write general formula of the Trapezoidal Rule.

Nyatakan DUA (2) ciri Hukum Trapezoidal untuk pengiraan luas yang dibatasi garis sempadan tidak sekata. Tuliskan formula umum Hukum Trapezoidal.

[5 marks]
[*5 markah*]

CLO1
C2

(b) Calculate the area in **Figure B2 (b)** using Simpson's Rule and Trapezoidal Rule. Given the interval offset is 5 meter.

Kirakan luas Rajah B2 (b) menggunakan Hukum Simpson dan Hukum Trapezoidal. Diberi sela ofset adalah 5 meter.
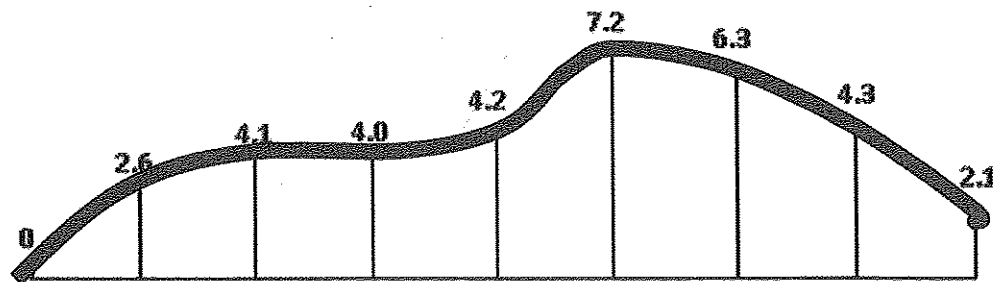

Figure B2 (b) / *Rajah B2 (b)*

[10 marks]
[*10markah*]

CLO1
C3

(c) **Figure B2 (c)** shows basement excavation for a construction project with a reduced level in each point. Calculate the volume of excavation by the triangle method height of three square points. Given the finish platform level formation is 8m.

Rajah B2 (c) menunjukkan korekan bagi tingkat bawah tanah untuk sebuah projek pembinaan berserta aras laras setiap titik. Kirakan isipadu korekan dengan kaedah segi tiga. Diberi aras formasi terakhir platform ialah 8m.
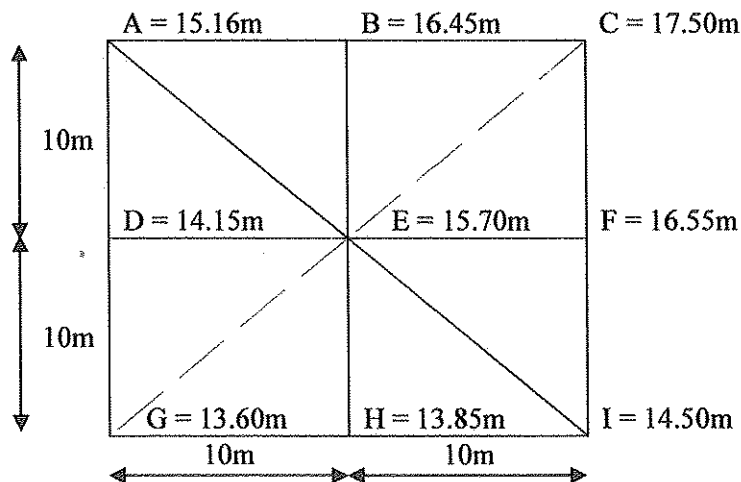

A = 15.16m   B = 16.45m   C = 17.50m
10m
D = 14.15m   E = 15.70m   F = 16.55m
10m
G = 13.60m   H = 13.85m   I = 14.50m
10m   10m

Figure B2(c) / *Rajah B2(c)*

[10 marks]

[*10markah*]

QUESTION 3
SOALAN 3

CLO1
C1

(a) Describe about Mass Haul Diagram

Terangkan mengenai Gambarajah Urungan Padu.

[5 marks]
[5 *markah*]

CLO1
C2

(b) Explain briefly the terms below:

Terangkan secara ringkas terma di bawah:

i. Freehaul

Angkut percuma

ii. Overhaul

Angkut lebih

iii. Haul distance

Jarak Angkut

iv. Bulking

Pengembangan

v. Borrow

Pinjam

[10 marks]
[*10markah*]

CLO1
C3

(c) **Table B3** shows the data for cut & fill work in a construction site. Based on data given:

Jadual B3 menunjukkan data untuk satu kerja gali dan timbus di satu tapak pembinaan. Berdasarkan data yang diberikan:

i. Calculate the cumulative volume of by consider 8% of shrinkage for filled volume.

Kirakan isipadu kelompok dengan mengambilkira 8% penyusutan untuk isipadu timbusan.

[5 marks]

[*5 markah*]

ii. From the answer in c (i), draw a mass haul diagram

Daripada jawapan di c (i), lukiskan Gambarajah Urungan Padu.

[5 marks]

[*5 markah*]

Table B3 / *Jadual B3*

Chainage/ Rantaian (m)	Cut/ korekan (m³)	Fill/ Timbusan (m³)
0		0
100	1100	
200	18000	
300		33000
450		12000
550		10000
600		3000
700	7050	
800	12000	

QUESTION 4
SOALAN 4

CLO1
C1

(a) Describe the types of curve as below:

Terangkan jenis-jenis lengkung di bawah :

    i. Circular Curve

       Lengkung Bulat

    ii. Transition Curve

       Lengkung Peralihan

    iii. Combined Curve

       Lengkung Bergabung

    iv. Vertical Curve

       Lengkung Pugak

    v. Compound Curve

       Lengkung Majmuk

[5 marks]

[*5 markah*]

CLO1
C2

(b) The two straight roads is projected to intersection point at I with deflection angle 50°08′00″. The straights roads are to be connected of radius 200m and the chainage of I being 2500m. Using the Offset From Deflection Angle Method, calculate:

Dua jalan lurus diunjurkan bertemu di titik persilangan I dengan sudut pesongan 50°08′00″. Jalan lurus tersebut disambungkan dengan sebuah lengkung berjejari 200m dan rantaian I adalah 2500m. Menggunakan Kaedah Offset Dari Sudut Pesongan, hitungkan:

    i. Tangent length, IT

      Panjang Tangen, IT

    ii. Chainage of T1

      Rantaian T1

    iii. Curve length, L

      Panjang lengkungan, L

    iv. Chainage of T2

      Rantaian T2

[10 marks]

[*10 markah*]

CLO1
C3

(c) From answer in Question 4(b), complete table booking of curve using Deflection Angle Method with chord length is 25m. Given formula of Deflection Angle, $\delta = [(1718.9 \times C /R) \div 60°]$.

Dari jawapan soalan 4(b), lengkapkan jadual pembukuan lengkung dengan menggunakan Kaedah Sudut Pesongan dengan panjang sub-perentas 25m. Diberi formula Sudut Pesongan $\delta = [(1718.9 \times C /R) \div 60°]$.

[10 marks]

[*10 markah*]

SOALAN TAMAT

AREA AND VOLUME

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

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

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

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

v. $\quad$ 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

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

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

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

CURVE

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

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

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, $X = \sqrt{\left(R^2 - Y^2\right)} - \sqrt{\left(R^2 - \left(\dfrac{W}{2}\right)^2\right)}$

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

Sub chords line method

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

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

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

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

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

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

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

TANGENT LINE METHOD

OFFSET (Y)	R	R^2	Y^2	$\sqrt{(R^2 - Y^2)}$	X

LONG CHORD METHOD

OFFSET (Y)	R	R^2	Y^2	$(W/2)^2$	$\sqrt{(R^2 - Y^2)}$	$\sqrt{(R^2 - (W/2)^2)}$	X

CIRCULAR CURVES - DEFLECTION ANGLE METHOD

POINTS	CHAINAGE	INTERVAL	DEFLECTION ANGLE (δ)	CUMULATIVE DEFLECTION ANGLE

SUB CHORDS LINE METHOD

POINTS	CHAINAGE	INTERVAL	OFFSET

TRANSITION CURVE METHOD

POINTS	CHAINAGE	SUB CHORD	CHORD LENGTH	CUMULATIVE ANGLE

VERTICAL CURVE METHOD

POINTS	CHAINAGE	SUB CHORD	CHORD LENGTH	(m)y /100	(A)y2 / 200L	Δh	RL