POLITEKNIK
MALAYSIA

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK
KEMENTERIAN PENDIDIKAN TINGGI

JABATAN KEJURUTERAAN AWAM

PEPERIKSAAN AKHIR

SESI DISEMBER 2016

DCC3093 : ENGINEERING SURVEY 2

TARIKH : 09 APRIL 2017
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 : 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 only.

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

QUESTION 1
SOALAN 1

CLO1
C2

(a)

   i) List the various method of setting out a simple circular curve.

     Senaraikan kaedah-kaedah pemancangan tanda lengkung mudah.

   ii) Explain with the aid of sketch the elements of a simple circular curve.

     Terangkan dengan bantuan gambarajah elemen-elemen lengkung mudah

[8 marks]
[*8 markah*]

CLO1
C3

(b) Two straights lines AI and BI meet at chainage of 3450 m. A simple circular curve of 250 m radius joins them. The deflection angle between the two straights lines is 50°. If the chord intervals is 30 m, calculate the necessary data to layout the curve using Deflection Angle Method.

Dua laluan lurus AI dan BI bertemu di rantaian 3450 m. Suatu lengkung bulat berjejari 250 m menghubungkan kedua-duanya dan sudut pesongan antara dua laluan lurus tersebut adalah 50°. Jika sela jarak yang digunakan adalah 30 m, kirakan data yang diperlukan untuk pemancangan lengkung tersebut menggunakan Kaedah Sudut Pesongan.

[17 marks]
[*17 markah*]

QUESTION 2
SOALAN 2

CLO1
C2

(a)

i) Identify **THREE (3)** forms of control provided by setting out processes.

*Kenalpasti **TIGA (3)** bentuk kawalan yang disediakan melalui proses*

pemancangan tanda.

[3 marks]

[3 *markah*]

ii) **Table 2(a)** shows the leveling booking for a culvert setting out work. The

culvert distance from A to E is 100.000 m with 1:120 gradients.

Jadual 2(a) menunjukkan pembukuan aras bagi kerja-kerja pemancangan

tanda sebuah pembetung. Jarak pembetung dari A ke E adalah 100.000 m

dengan kecerunan 1:120.

Table 2(a)/ *Jadual 2(a)*

FS	IS	BS	H.O.C	R.L	CHAINAGE	REMARK
0.520			*A*	150.000		BM1(RL=150.000)
	1.120			*B*	0	A
	2.835			*C*		Inv. Level A
	1.215			*D*	25	B
	1.685			*E*	50	C
	1.835			*F*	75	D
	1.905			*G*	100	E
2.81		2.010	*I*	*H*		TP
		1.320		*J*		BM2 (RL=150.000)

Determine value of Reduce Level and Height of Collimation in the table (*A* to *J*).

Tentukan nilai bagi Aras Laras dan Tinggi Kolimantan dalam jadual (A ke J).

[5 marks]
[5 *markah*]

CLO1
C3

(b)   Based on the data and answer in **Q2 (a),** calculate height of the sight rail (H)

to be built at A, B, C, D and E. Given traveler level = 2.500m**.**

*Berdasarkan data dan jawapan di **Q2 (a),** kirakan aras laras rel aras di A,B,C*

D dan E. Diberikan panjang pengembara = 2.500 m.

[17 marks]

[17 *markah*]

SECTION B: 100 MARKS
BAHAGIAN B: 100 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 the advantage of EDM instrument compared to the conventional instrument.

Senaraikan kelebihan alat EDM berbanding peralatan konvensional.

[5 marks]
[5 *markah*]

CLO1
C2

b) Explain the Electro Optic Wave System and Micro Wave System.

Terangkan berkenaan Sistem Gelombang Elektro Optik dan Sistem Gelombang Mikro.

[10 marks]
[10 *markah*]

CLO1
C3

c) Describe the mentioned errors occurred on EDM instrument.

Jelaskan dengan jelas mengenai kesalahan yang berlaku pada alat EDM seperti dinyatakan.

     i) Zero error

        Selisih sifar

     ii) Scale error

        Selisih berskala

     iii) Cyclic error

        Selisih berkitar
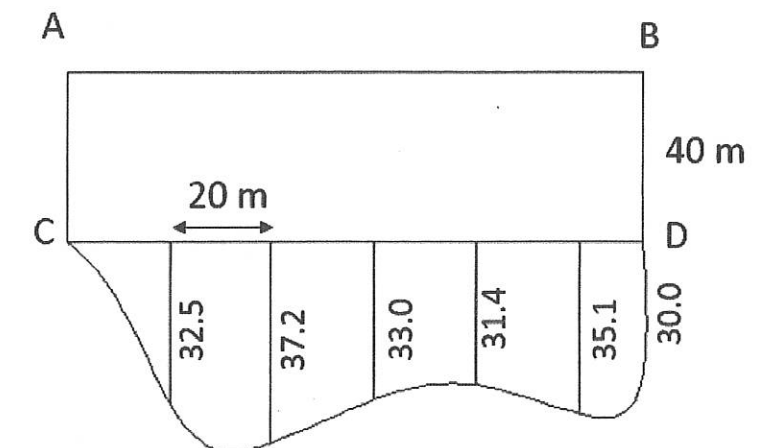
[10 marks]
[10 *markah*]

QUESTION 2
SOALAN 2

CLO1
C1

a) State **THREE (3)** methods to measure area.

*Nyatakan **TIGA (3)** cara untuk mengukur luas.*

[3 marks]
[3 *markah*]

CLO1
C2

b) Based on **Figure B2.** Calculate this area using Simpson method.

*Berdasarkan **Gambarajah B2**, kirakan luas kawasan tersebut menggunakan Kaedah Simpson.*

[10 marks]
[10 *markah*]

Figure B2/ *Gambarajah B2*

CLO1
C3

c) Series of ordinate measured 0, 7.2, 5.4, 6.0, 6.8, 7.4, 8.2 and 0 for every 20m interval chainage. Calculate area for that area using Trapezoidal Method and Simpson's Rule .

Satu siri ordinat telah ukur 0, 7.2, 5.4, 6.0, 6.8, 7.4, 8.2 dan 0 untuk rantaian bersela 20m. Kira luas kawasan tersebut menggunakan formula Trapezoidal dan Simpson's Rule.

[12 marks]
[12 *Markah*]

QUESTION 3
SOALAN 3

CLO1
C1

a)   State **THREE (3)** uses of the Mass Haul Diagram (MHD)

*Nyatakan **TIGA (3)** kegunaan gambarajah urungan padu (GUP)*

[3 marks]
[*3 markah*]

CLO1
C2

b)   By referring to **Figure B3**, identify the balance line, free haul distance, overhaul   distance, free haul volume and overhaul volume. Calculate the overhaul dan freehaul.

*Berdasarkan **Rajah B3**, kenal pasti garis seimbang, jarak angkut percuma, jarak purata angkut lebih, isi padu angkut percuma dan ispadu angkut lebih. Kirakan angkut lebih dan angkut percuma.*
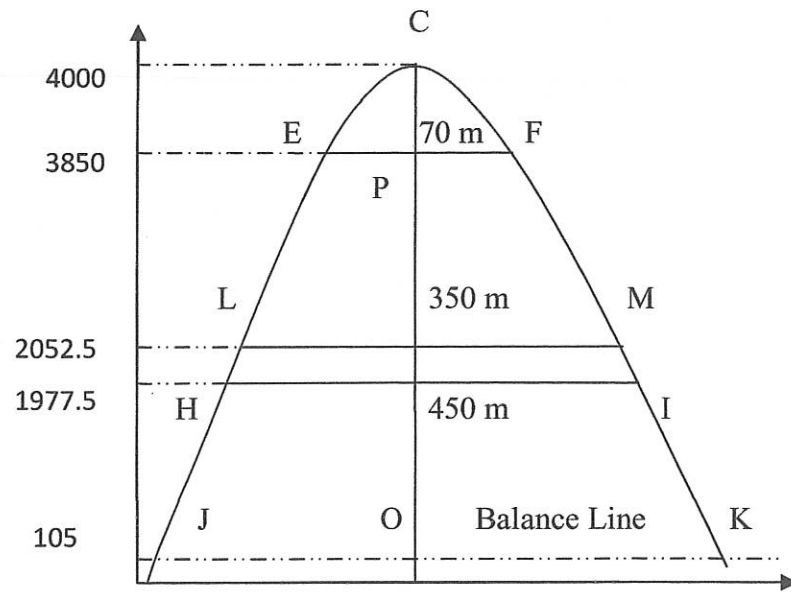
Figure B3 / *Rajah B3*

[10 marks]
[*10 markah*]

CLO1
C3

c)   Plot the Mass Haul Diagram (MHD) graph by using the horizontal scale of 1 cm = 50 m and the vertical scale of 1 cm = 10 000 m^3 according to the data in **Table B3** below:

*Lukiskan rajah gambarajah urungan padu dengan menggunakan skala mendatar 1 cm = 50 m dan skala menegak 1 cm = 10 000 m^3 berdasarkan kepada data **Jadual B3** dibawah:*

Table B3/ *Jadual B3*

Chainage (m)	Volume (m^3)	
	Cut	Fill
0	-	-
50	-	13000
100	-	22500
250	-	7500
300	5250	-
350	16375	-
400	22375	-
450	28500	-
500	34250	-
550	35750	-
600	33500	-

[12 mark]
[*12 markah*]

QUESTION 4
SOALAN 4

CLO1
C1

(a) Give **THREE (3)** circular curve ranging setting-out methods.

*Berikan **TIGA (3)** kaedah pemancangan lengkung bulat.*

[3 marks]

[*3 markah*]

CLO1
C2

(b) The centre-line of two straight roads are projected forward to meet at I, the intersection angle is 30°. If the straight line are to be connected by a circular curve of a radius of 200m, assuming 15m chords on a through chainage basis and the chainage of I is 2259.59m. Using the Offset From Deflection Angle Method, calculate;

Garis Pusat dua jalan lurus diunjurkan dan bertemu di persilangan I, bersudut 30°. Jika garis lurus tersebut disambungkan dengan lengkungan berjejari 200m, andaikan garis rentas 15m dan melalui rantaian mula dan rantaian I adalah 2259.59m, menggunakan Kaedah Ofset dari Sudut Pesongan, kirakan;

  i) Tangent length, IT and curve length, L.

  Panjang Tangen, IT dan panjang lengkungan, L.

[4 marks]
[*4 markah*]

  ii) Chainage of T1 and Chainage of T2.

  Rantaian T1 dan Rantaian T2.

[6 marks]
[*6 markah*]

CLO1
C3

(c) From information given in Question 4(b), calculate data Table of Deflection Angle Method with subchord is 15m.

Daripada maklumat yang diberi dalam soalan 4(b), kirakan data Jadual Kaedah Sudut Pesongan dengan sela 15m.

[12 marks]
[*12 markah*]

SOALAN TAMAT

Formula DCC 3093- Engineering Surveying 2

A. TACHYMETRY

a) Incline Sight With The Staff Vertical
1. $H = Ks.Cos\theta^2 + (C.Cos\theta)$
2. $V = \frac{1}{2}(Ks.Sin\,2\theta) + (C.Sin\theta)$
3. $dH = hi + V - h$
4. $RL_{staff} = RL_{stn} + hi + V - h$
5. $a^2 = b^2 + c^2 - 2ab\,kos\,A$

b) Incline Sights With the Staff Normal
1. $H = (Ks + C)\cos\theta + (h\sin\theta)$
2. $V = (Ks + C)\sin\theta$
3. $RL_{stan} = RL_{stn} + hi + V - (h\cos\theta)$
4. $d_H = hi + V - (h\cos\theta)$

c) The Tangential System
1. $H = \dfrac{s}{(\tan\alpha - \tan\beta)}$

  If used α,
2. $V_a = H\tan\alpha$
3. $d_H = hi + V_a - h_a$
4. $RL_{staff} = RL_{stn} + hi + V_a - h_a$

  If used β,
2. $V_b = H\tan\beta$
3. $d_H = hi + V_b - h_b$
4. $RL_{staff} = RL_{stn} + hi + V_b - h_b$

B. AREA & 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) $Area = \frac{1}{2}\,a\,b\,sin\,c°$
iv) $Area = a \times b$
v) $Area = \frac{1}{2}(a + b) \times h$

Trapezoidal Rule $= D/2\,(O_1 + O_n + 2\,\Sigma O_{others})$

Mid ordinate rule $= D\,(sum\ of\ mid\ ordinate)$

Simpson Rule $= D.3\,(O_1 + O_n + 4\,\Sigma even\ ordinate + 2\,\Sigma odd\ ordinate)$

Cross Sectional Area
$= h(b + sh)$
$= \frac{1}{2}\,m\,[(b/2 + mh)(w_1 + w_2) - b^2/2]$
$= \frac{1}{2}[(b/2 + kh)^2/(k-m)]\ \&\ = \frac{1}{2}[(b/2 - kh)^2/(k-m)]$
$= 1/2m[(w_1 + w_2)(mh + b/2) - b^2/2]$

C. MASS HAUL DIAGRAM

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

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

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

D. CURVE

Tangent length $= R \tan \theta/2$

Long chord length $= 2R \sin \theta/2$

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

Chainage T_1 $=$ Chainage I $-$ tangent length

Chainage T_2 $=$ Chainage T_1 $+$ arc length

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

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

Deflection angle method $\delta_{(\text{tangent})} = \dfrac{1718.9 \times C}{60R}$ @ $\delta_{(\text{radial})} = \dfrac{1718.9 \times C}{R}$

Sub chords line method $Offset_1 = \dfrac{a^2}{2R}$ $Offset_2 = \dfrac{b(b+a)}{2R}$ $Offset_{others} = \dfrac{b^2}{R}$ $Offset_c = \dfrac{c(b+c)}{2R}$

Setting out transition curves $= 573 \, l^2 / (60RL)$

Length of transition curve $= v^3/3.6^3 \, Cr$

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

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

Vertical Curves, $RL = RL_{T1} + [(my/100) - (Ay^2/200L)]$

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 $T_1 = RL_I - \Delta h_m$

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

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