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UNIVERSITI SAINS MALAYSIA

First Semester Examination  
Academic Session 2008/2009

November 2008

**EAK 263/4 – Geomatic Engineering**  
*[Kejuruteraan Geomatik]*

Duration: 3 hours  
*[Masa : 3 jam]*

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Please check that this examination paper consists of **EIGHT (8)** pages of printed material before you begin the examination.

*[Sila pastikan kertas peperiksaan ini mengandungi **LAPAN (8)** muka surat bercetak sebelum anda memulakan peperiksaan ini.]*

**Instructions:** Answer **ALL FIVE (5)** questions. All questions carry the same marks.

*[**Arahan:** Jawab **SEMUA LIMA (5)** soalan. Semua soalan membawa jumlah markah yang sama.]*

You may answer the question either in Bahasa Malaysia or English.

*[Anda dibenarkan menjawab soalan sama ada dalam Bahasa Malaysia atau Bahasa Inggeris.]*

All questions **MUST BE** answered on a new sheet.

*[Semua jawapan **MESTILAH** dijawab pada muka surat baru.]*

Write the answered question numbers on the cover sheet of the answer script.

*[Tuliskan nombor soalan yang dijawab di luar kulit buku jawapan anda.]*

1. Despite all the necessary steps taken to carry out the temporary adjustment to a level in a leveling task, the leveling bubble remains to be off-centered and the misclosure obtained exceeded the allowable limit.

*Walau pun semua langkah penting telah diambil semasa melakukan pelarasan sementara ke atas alat aras semasa menjalankan kerja ukur aras, gelembung aras tetap tidak memusat dan tikaian yang diperolehi melebihi had yang dibenarkan.*

- (a) Describe in detail how the above level is to be checked in the field and outline the steps that should be taken to overcome the situation.

(15 marks/markah)

*Huraikan dengan jelas bagaimana alat aras di atas disemak di lapangan dan nyatakan langkah-langkah yang perlu diambil untuk mengatasi keadaan tersebut.*

- (b) Table 1 shows the data obtained while conducting a leveling task.

*Jadual 1 menunjukkan data yang diperolehi semasa menjalankan kerja ukur aras.*

<b>BS (PB)</b>	<b>IS (PA)</b>	<b>FS (PH)</b>	<b>REMARKS (CATATAN)</b>
0.599			BM A475 (RL: 8.031 m)
2.587		3.132	A
	1.565		B
	1.911		C
	0.376		D
2.244		1.522	E
	3.771		F
1.334		1.985	G
	0.601		H
		2.002	BM A482 (RL: 6.174 m)

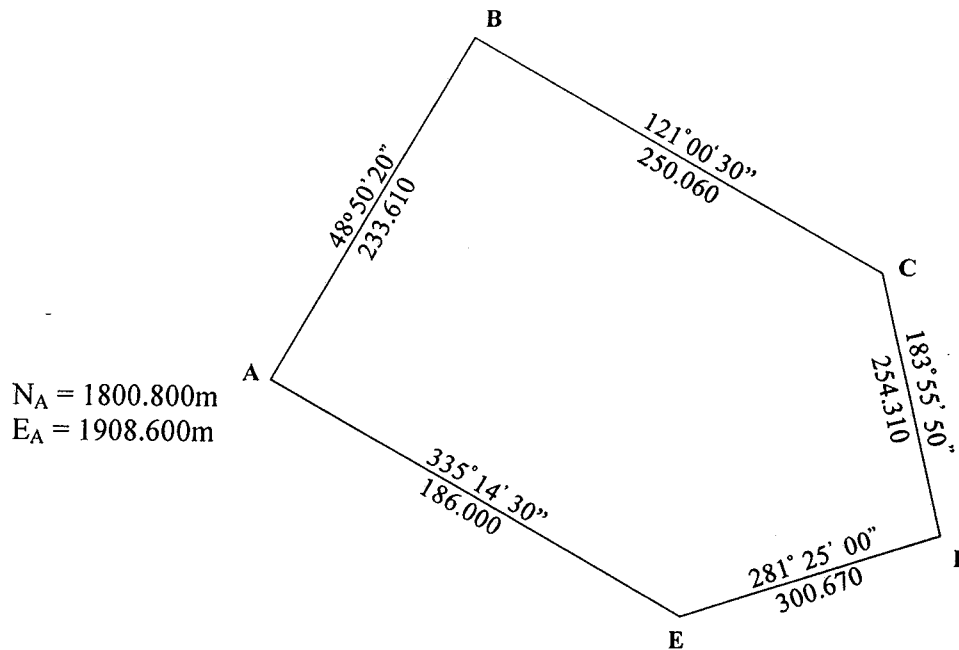
The distance from BM A475 to BM A482 is 0.500m. Reduce the survey data and adjust the calculated value of reduced level of each point and comment on your results.

(5 marks/markah)

Jarak dari BM A475 ke BM A482 ialah 0.500m. Laraskan data ukur dan nilai aras laras bagi tiap-tiap titik dan komen ke atas keputusan yang diperolehi.

2. A traverse was carried out and the results of the survey are as shown as Figure 1.

Sebuah pengukuran travers telah dijalankan dan keputusan pengukuran adalah seperti yang dipaparkan di Rajah 1.

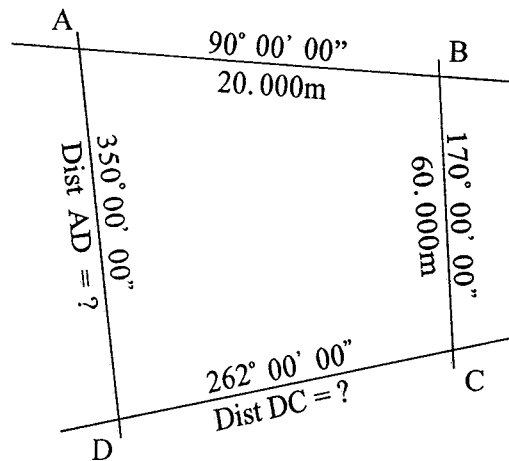


Figure/Rajah 1

2. (a) Find the adjusted coordinates of stations B, C, D and E using the Bowditch method of adjustment and determine the linear misclosure of the traverse.

(14 marks/markah)

Dengan menggunakan kaedah pelarasan Bowditch, kira koordinat terlaras bagi stesen B, C, D dan E dan tentukan tikaian lurus travers tersebut.



Figure/Rajah 2

2. (b) Figure 2 above shows a piece of land with some information missing. If the coordinates of A and C are (0.000mN, 0.000mE) and (-59.088mN, 30.419mE) respectively, find the distances of CD and AD.

(6 marks/markah)

*Rajah 2 di atas menunjukkan sekeping tanah di mana beberapa maklumat didapati hilang. Jika koordinat bagi A dan C adalah masing-masing (0.000mU, 0.000mT) dan (-59.088mU, 30.419mT), kira jarak CD dan AD.*

3. (a) What is survey reconnaissance and state **FOUR (4)** reasons why it is one of the most important aspects of any survey?

(5 marks/markah)

*Apakah ukur tinjauan dan nyatakan **EMPAT (4)** sebab kenapa ianya merupakan salah satu aspek terpenting dalam mana-mana kerja pengukuran?*

- (b) A steel band of nominal length 30m was used to measure a line XY by suspending it between supports at both ends and the following information was recorded:

*Satu pita keluli panjang namaan 30m telah digunakan untuk mengukur jarak garisan XY dengan menupang di kedua-dua penghujungnya dan maklumat berikut telah dicatat:*

Measured length ( <i>jarak diukur</i> )	:	29.874m
Slope angle ( <i>sudut cerun</i> )	:	03° 30' 30"
Mean temperature ( <i>suhu min</i> )	:	28°C
Tension applied ( <i>teganggan dikenakan</i> )	:	110N

Young's modulus ( $E$ ) for the tape material is  $200 \text{ kNmm}^{-1}$  and the coefficient of thermal expansion ( $\alpha$ ) is 0.000 0112 per °C. The standardized length of the tape against a reference tape was known to be 30.016 m at 20°C and 50N tension. If the tape weighs  $0.17 \text{ Nm}^{-1}$  and has a cross-sectional area of  $2 \text{ mm}^2$ , calculate the horizontal length of XY.

(15 marks/markah)

*Modulus Young ( $E$ ) bagi bahan pita ialah  $200 \text{ kNmm}^{-1}$  dan angkali pengembangan - terma ( $\alpha$ ) ialah 0.000 0112 per °C. Panjang berpiawai pita berbanding dengan pita rujukan ialah 30.016 m pada suhu 20°C dan tegangan 50N. Jika berat pita ialah  $0.17 \text{ Nm}^{-1}$  dan luas keratan rentasnya ialah  $2 \text{ mm}^2$ , kira jarak ufuk XY.*

4. (a) In stadia tacheometry, a staff is held vertically at A at one end of the line being measured and a theodolite is set up above the other at B. Sketch suitable diagrams to show how the horizontal distance AB, vertical distance and the reduced level of point B are deduced when point A is higher AND lower than point B.

(5 marks/markah)

*Dalam tekemetri stadia, staf berdiri tegak di A di satu hujung garisan yang diukur dan tiodolit didirikan di hujung garisan di B. Lakarkan gambar rajah yang sesuai bagi menunjukkan bagaimana jarak ufuk AB, jarak pugak dan aras laras titik B diperolehi apabila titik A lebih tinggi DAN rendah dari titik B.*

- (b) The accuracy of stadia tacheometry depends on both the instrumental errors and the field errors. State **TWO (2)** possible sources of field errors and how the effects could be minimized.

(5 marks/markah)

*Kejituan tekimetri stadia bergantung kepada ralat-ralat alatan dan lapangan. Nyatakan DUA (2) sumber ralat lapangan dan bagaimana kesannya boleh dikurangkan.*

- (c) "Often court proceedings involve surveys made long after. In such cases, it is quite likely that old field notes will be the only visible evidence, and the value will depend largely upon the clarity and completeness with which they are recorded."

Referring to the above statement, explain the importance of proper field booking that constitutes a permanent record of survey for engineers.

(5 marks/markah)

*"Perbicaraan di mahkamah sering melibatkan kerja-kerja pengukuran yang dijalankan terdahulu. Dalam kes-kes sebegini, catatan buku kerja lapangan mungkin merupakan satu-satunya bukti yang nyata dan nilainya banyak bergantung kepada sejauh mana jelas dan lengkapnya catatan tersebut."*

*Dengan merujuk kepada kenyataan di atas, terangkan kepentingan pembukuan buku kerja lapangan yang merupakan rekod tetap kerja-kerja pengukuran bagi jurutera.*

- (d) The choice of a proper contour interval for a topographic survey and map is based upon four principle considerations. Briefly explain any **THREE (3)** of these considerations.

(5 marks/markah)

*Pemilihan sela kontur yang sesuai bagi peta dan ukur topografi adalah berdasarkan kepada empat prinsip utama. Terangkan secara kasar mana-mana TIGA (3) prinsip tersebut.*

5. (a) A piece of land in Nibong Tebal having an irregular boundary of 960m in length has been designated as a new landfill site. The boundary has been marked off into **EIGHT (8)** equal intervals and is recorded as follows:

50m, 130m, 150m, 180m, 200m, 240m, 120m, 60m and 50m

Find the area of the landfill in hectares using the Simpson's rule.

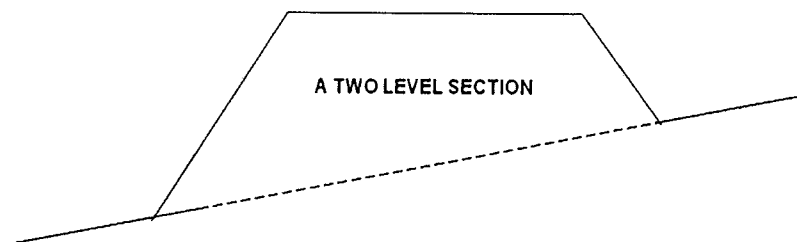
(10 marks/markah)

*Sekeping tanah di Nibong Tebal yang mempunyai sempadan tidak sekata sepanjang 960m telah dikenalpasti sebagai tapak pelupusan baru. Sempadan tersebut telah dibahagi kepada **LAPAN (8)** bahagian sama rata seperti catatan berikut:*

*50m, 130m, 150m, 180m, 200m, 240m, 120m, 60m dan 50m*

*Kira keluasan tapak pelupusan tersebut dalam hektar dengan menggunakan rumusan Simpson.*

(b)



**Figure/Rajah 3**

Road width (*Lebar aras bentukan*) = 20 m

Existing ground slope (*Cerun permukaan asal*) = 1 in 10

Side slope (*cerun sisi tambakan*) = 1 in 2

Centre height (*tinggi permukaan tengah*) = 10 m