Cover Type B

UTS

University of Technology, Sydney

TO BE RETURNED AT THE END OF THE EXAMINATION.
THIS PAPER MUST NOT BE REMOVED FROM THE EXAM CENTRE.

SURNAME: _____

FIRST NAME: _____

STUDENT NUMBER: _____

COURSE: _____

AUTUMN SEMESTER, 2010

SUBJECT NAME: SURVEYING

SUBJECT NO.: 48320

DAY/DATE: THURSDAY 17 JUNE 2010

TIME ALLOWED: TWO Hours plus TEN Mins reading time

START/END TIME: 2 pm - 4.10 pm

NOTES/INSTRUCTIONS TO CANDIDATES:

Attempt ALL questions.
Write the answers in the spaces provided.
The questions are not of equal value. Marks for each part are shown adjacent to that part of a question.
THIS IS A CLOSED BOOK EXAM.
Calculators and drawing instruments are allowed.
Formulae are provided at the end of the examination paper.
All of the diagrams are sketches for illustrative purposes and are not to scale.
If not enough room has been provided for calculations or written answers, please use the back of adjacent pages and note this fact, so the marker can see your complete answer or working.

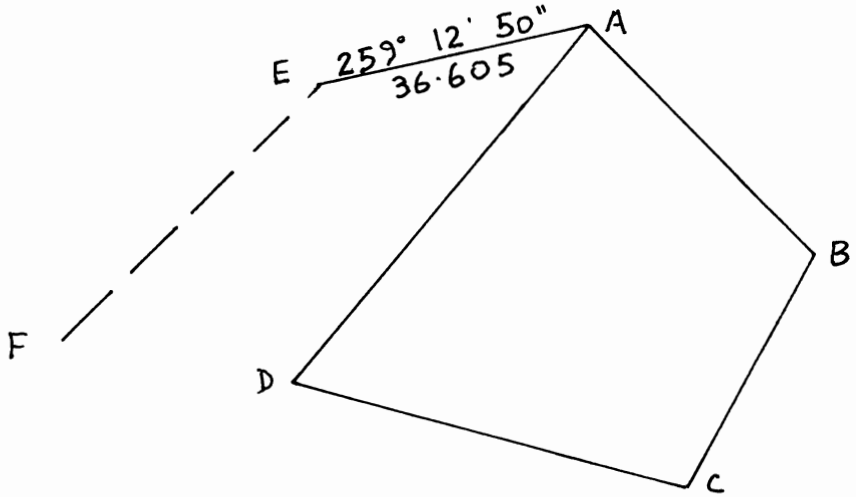
QUESTION 1 (20 Marks)

A traverse was carried out as shown in the diagram below and the results placed in the table.

At point A, a radiation was made to point E which is one end of a pipeline. Point F is the other end of the pipeline. The Coordinates of point A are 100E, 200N.

The coordinates of point F are 28.920E, 160.255N.

a) (8 marks) Complete the traverse table
b) (4 marks) Calculate the misclose and proportional accuracy of the traverse.
c) (2 marks) Calculate the coordinates of point E
d) (6 marks) Calculate the bearing and distance of the pipeline EF.



LINE	BEARING	DISTANCE	ΔE	ΔN	E	N	POINT
					100.000	200.000	A
A – B	$138^0$21'30"	41.375					B
B - C	$210^0$17'50"	38.925					C
C – D	$285^0$00'50"	52.105					D
D – A	$39^0$44'00"	66.375					A

Misclose of Traverse_____ Proportional Accuracy 1 in _____

Coordinates of point E _____E _____N

Bearing and distance of pipeline_____

PTO

QUESTION 2 (20 Marks)
The design grade levels for a section of road way are as follows:

Chainage	200	270	300	370
R.L.	42.98	34.30	32.806	46.386

The existing road has a 30m vertical curve with its IP at chainage 285.
The road way is to be improved by building an 85m long vertical curve, with the new IP to be at Chainage 293.00. The entry and exit grades will not be altered.

Calculate: the entry and exit grades (4 Marks)
chainages and R.L.s of the new tangent points (place them in the table below) (4 Marks)
the design R.L.s at chainages 270 and 300 (6 Marks)
the chainage and R.L. of the Low Point on the curve. (4 Marks)

Chainage	Grade	Grade Level	x	Ordinate	Design Level
200					
T.P.1					
270					
I.P. 293.00					
300					
T.P. 2					
370					
Low Pt					

QUESTION 3 (20 Marks)

Referring to the horizontal curve shown below, determine the values requested.

a) **(6 Mks)** PROVE that the Deflection Angle is 120° 50' and radius = 200.0m
(Note: If you can not do this, adopt these values an continue with the question)

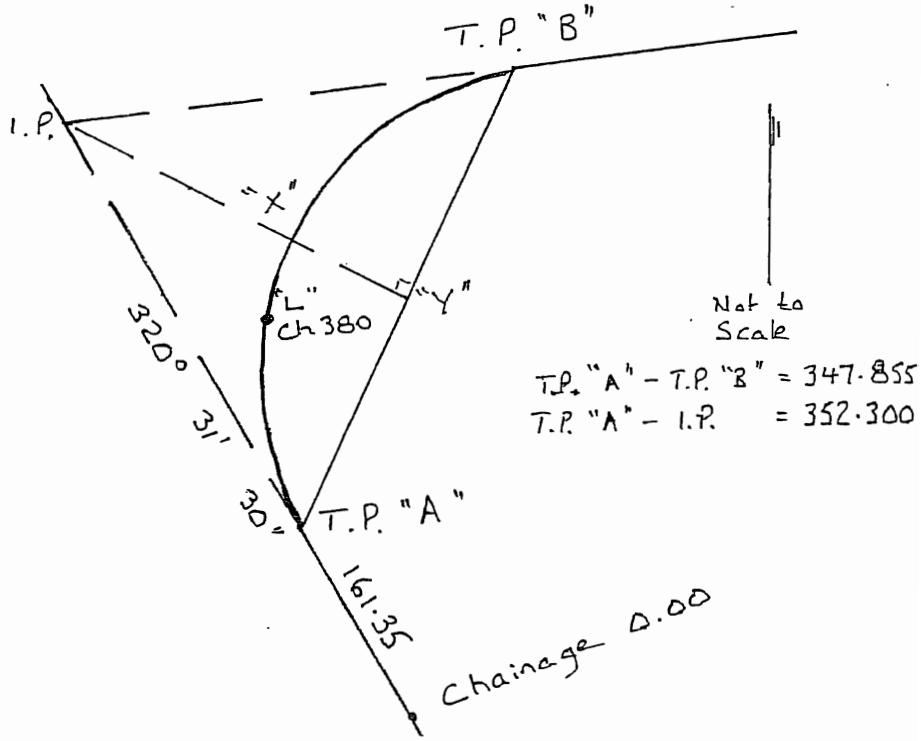
b) Chainage of T.P. "A" **(1 Mk)** ....., Chainage of "X" **(1 Mk)** ....., Chainage of T.P. "B" **(2 Mk)**.....,

c) Bearing of I.P to "X" **(2 Mks)** .....

d) Distance from I.P. to "X" **(2)** ....., Distance "X" to "Y" **(2)** .....

e) Bearing and Distance T.P. "A" to "X" **(2 Mks)** .....

f) Bearing and Distance T.P. "A" to 'L" **(2 Mks)** .....



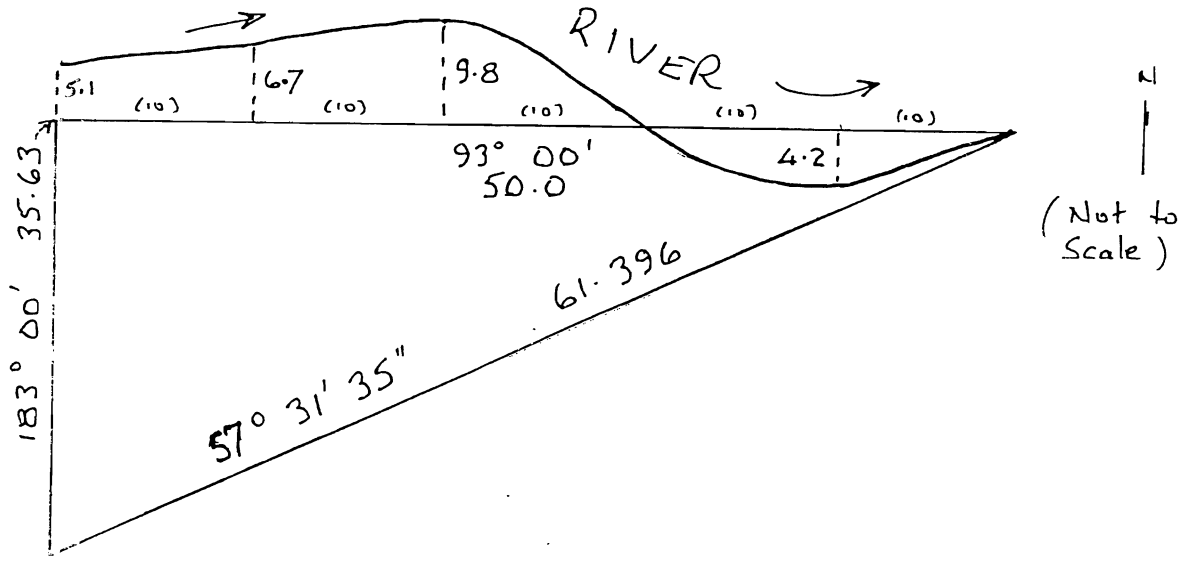
QUESTION 4 (8 Marks)

The plan below shows a block of land, of which one of its boundaries is a river.

Using the dimensions shown for the (straight) traverse lines calculate the area within the traverse **(3 Marks)**

Use the offsets from the traverse line to the river to calculate the extra usable land in the block. **(4 Marks)**

State the total area of the block of land **(1 Mark)**

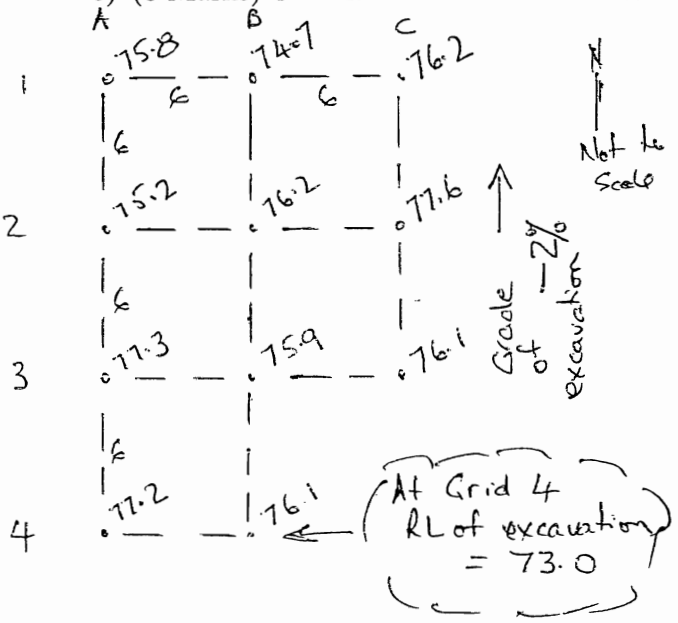


P.T.O.

QUESTION 5 (12 Marks)

The grid below was levelled for a proposed basement excavation, which is to have vertical sides around the perimeter. The base of the excavation is to have a 2% grade falling to the north, with the finished (excavated) R.L. at Grid Line 4 being 73.0. Each grid square is 6.0m by 6.0m.

a) (3 Marks) Calculate the finished (excavation) level at each of the grid lines 3, 2 and 1.
b) (3 Marks) Show on the diagram the depth of excavation at each grid point.
c) (6 Marks) Calculate the total volume of excavation required on this site.



ANSWERS

a) Excavation R.L. Grid Line 3 ..... Excavation R.L. Grid Line 2 .....

Excavation R.L. Grid Line 1 .....

c) Total volume to be excavated .....

P.T.O.

QUESTION 6 (20 marks)

a) (4 marks) Briefly describe an Identification survey. List three items that are included in an Identification Survey

b) (5 marks) Briefly describe an Easement. Include in your answer the terms Dominant and Servient Tenements and give two examples of an Easement.

PTO

c) (4 marks) What is a Cadastral Survey and by law who are the only people allowed to charge a fee for this type of survey. List two examples of Cadastral Surveys.

d) (4marks) Briefly describe two features of a Total Station Instrument which distinguish it from a conventional surveying theodolite.

e) (3 marks) List three errors which are present in measurements carried out by an EDM Instrument.

PTO

$C_{slope} = -L \times (1 - \cos\beta)$

$C_{slope} = -\left[\frac{\Delta h^2}{2L_m} + \frac{\Delta h^4}{8L_m^3}\right]$

$C_{temp} = \pm L \times \alpha \times (\Delta t)$

$\alpha_{steel} = 11.2 \times 10^{-6}/^0C$

$C_{sag} = -\frac{w^2 \times L^3}{24 \times T^2} \times \cos^2\beta$

$Grade = \frac{\Delta h}{HorDist.} \times 100$

$OM = \frac{L \times (G_2 - G_1)}{800}$

$PQ = \frac{4 \times x^2 \times OM}{L^2}$

$PQ = \left(\frac{G_2 - G_1}{200L}\right) \times x^2$

$x = \left(\frac{G_1}{G_1 - G_2}\right) \times L$

$H = 100 \times s \times \cos^2\theta$

$V = 100 \times s \times \sin\theta \times \cos\theta$

$RL_S = RL_T + HI + V - m$

$Tangent\ Dist. = R\tan\frac{\Delta}{2}$

$Secant\ Dist. = R\sec\frac{\Delta}{2}$

$External\ Dist. = R\left(\sec\frac{\Delta}{2} - 1\right)$

$Mid\ Ord = R\left(1 - \cos\frac{\Delta}{2}\right)$

$Chord = 2R\sin\frac{\Delta}{2}$

$Arc = R\theta^{rad.}$

$Arc = R\theta^{deg} \times \frac{\pi}{180}$

$\delta = \frac{arc}{2R} \times \frac{180}{\pi}$

$Chord = 2R\sin\delta$

$y_0 = R - \sqrt{R^2 - \left(\frac{C}{2}\right)^2}$

$y_1 = y_0 - \left[R - \sqrt{R^2 - x^2}\right]$

$Area = \pi R^2$

$Sector = \frac{1}{2}R^2\theta$

$Segment = \frac{1}{2}R^2(\theta - \sin\theta)$

$Area = w\left(\frac{O_1 + O_2}{2}\right)$

$Volume = \frac{w}{2}\left(A_1 + 2A_2 + 2A_3 + ...2A_{n-1} + A_n\right)$

$Volume = \frac{w}{3}\{A_1 + 4A_2 + 2A_3 + \cdots + 2A_{n-1} + A_n\}$

$Volume = \frac{Area}{4}\left(\Sigma d_1 + \Sigma 2d_2 + \Sigma 3d_3 + \Sigma 4d_4\right)$