

Cover Type B



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:** \_\_\_\_\_

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**MID SEMESTER EXAM  
AUTUMN SEMESTER, 2013**

**SUBJECT NAME: SURVEYING**

**SUBJECT NO.: 48320**

**DAY/DATE: 18 April 2013**

**TIME ALLOWED: 1.5 Hours + 10 mins reading time**

**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 of questions are shown adjacent to that part of a question.**

**THIS IS A CLOSED BOOK EXAM.**

**Calculators and drawing instruments are allowed.**

**If not enough room for working has been provided, please use the back of adjacent pages.**

**QUESTION 1 (18 Marks)**

Reduce the staff readings shown on the booking sheet below.

Show all checks.

Calculate the misclose of the levelling run.

If points "X" and "Y" are 80 metres apart, calculate the grade between "X" and "Y".

| B.S    | I.S.   | F.S.   | RISE | FALL | R.L. | REMARKS         |
|--------|--------|--------|------|------|------|-----------------|
| 1.325  |        |        |      |      |      | BM A4 RL 23.115 |
|        | 2.022  |        |      |      |      | A               |
|        | 3.575  |        |      |      |      | B               |
| 2.648  |        | 0.137  |      |      |      | CP1             |
|        | -1.803 |        |      |      |      | X               |
| 2.038  |        | 1.110  |      |      |      | C               |
| -1.062 |        | -2.075 |      |      |      | Y               |
|        | 1.325  |        |      |      |      | D               |
|        |        | 0.006  |      |      |      | BM A5 RL 28.870 |

**ANSWERS**

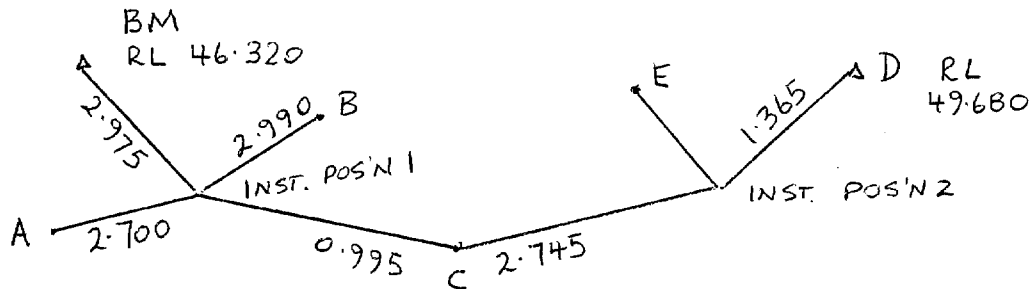
Misclose of level run..... Grade of line "X" – "Y".....

**QUESTION 2 (16 Marks)**

On the plan below, a level was set up at points labeled set up 1, set up 2 etc in sequence. The lines radiating from each set up represent lines of sight to staff positions. The staff readings observed to each position are noted along the line.

Book and reduce the levels using the HEIGHT OF PLANE OF COLLIMATION method.

Calculate the staff reading needed from instrument position 2 to set a mark at RL 52.345 at point E.



| B.S. | INT. | F.S. | Height of Plane of Collimation | R.L. | REMARKS |
|------|------|------|--------------------------------|------|---------|
|      |      |      |                                |      |         |
|      |      |      |                                |      |         |
|      |      |      |                                |      |         |
|      |      |      |                                |      |         |
|      |      |      |                                |      |         |
|      |      |      |                                |      |         |
|      |      |      |                                |      |         |
|      |      |      |                                |      |         |

Staff reading required at E.....

**QUESTION 3 (17 Marks)**

A level was set up to do a Two Peg test in the middle of a line 80m long. The reading to the staff at A was observed as 1.355m and the reading to the staff at B was 2.065m. The level was then moved to a point 10m away from A and 70m away from B and the following readings observed : to A, 1.020m and to B 1.760m.

Find the true difference in height between A and B.  
What is the collimation error in the level?

The level was not adjusted immediately but was used to find the R.L.s of points X and Y. The readings from this were as follows:

|                                    |                      |          |
|------------------------------------|----------------------|----------|
| Staff reading to BM (R.L. 25.000), | 60m away from level, | 2.500m   |
| Staff reading to X,                | 30m away from level, | - 1.450m |
| Staff reading to Y,                | 20m away from level, | 0.675m   |

Calculate the true R.L.s of points X and Y.

True difference in Height between A and B .....

Collimation Error in the level .....

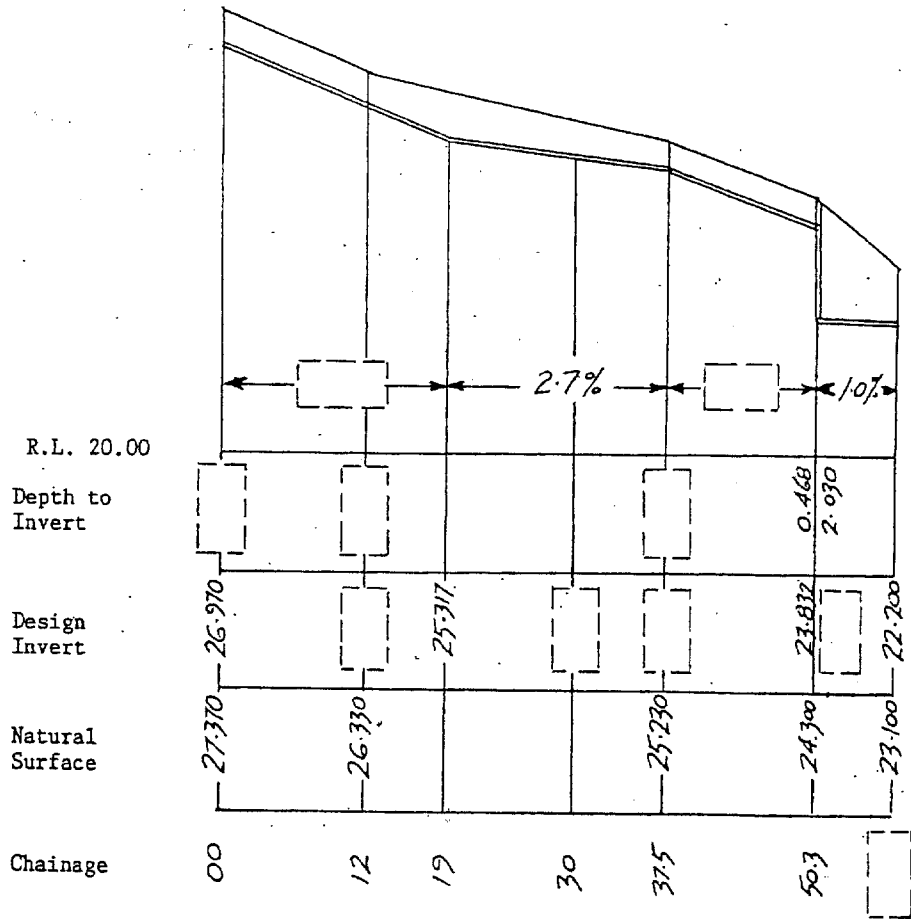
R.L. of X ..... , R.L. of Y..... ,

**QUESTION 4 (15 Marks)**

Referring to the longsection shown below, calculate and enter the missing information into each box.

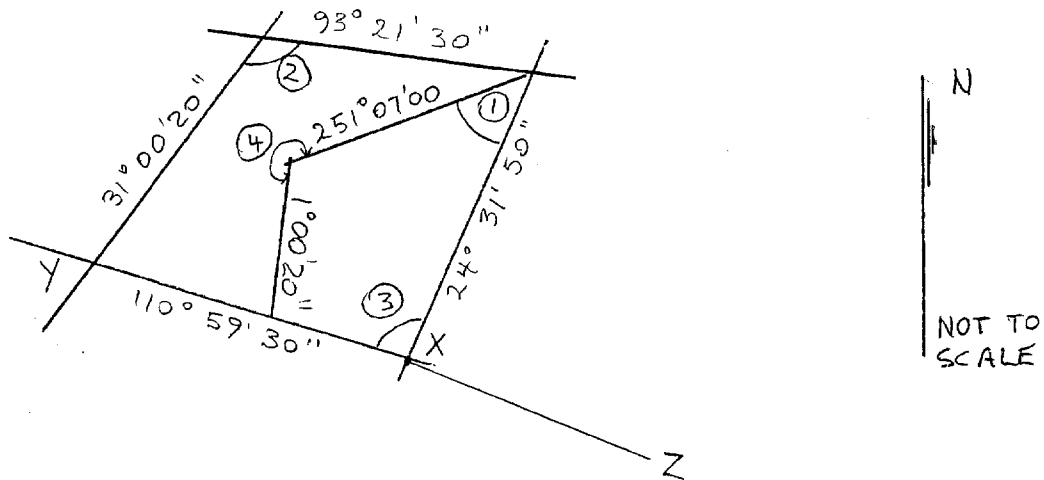
**Please show the grades to TWO decimal places and levels to THREE decimal places.**

Marking Scale: - 3 per error made. Minimum mark is 0.



**QUESTION 5 (18 Marks)**

- a) Using the plan shown below calculate the each of the angles as numbered 1, 2, 3 and 4 on the plan. (2 Marks each)



Angle at 1 ..... Angle at 2 .....  
 Angle at 3 ..... Angle at 4 .....

- b) The following field notes were made when reading angles at points shown on the same plan above. (4 Marks)  
 A theodolite is set up at point X - Horizontal angles read as follows

| Target | Face Left    | Face Right   | Mean | Reduced Mean |
|--------|--------------|--------------|------|--------------|
| Y      | 0° 00' 00"   | 180° 00' 20" |      |              |
| Z      | 181° 04' 10" | 1° 04' 30"   |      |              |

Calculate the bearing of the line XZ.

**BEARING OF XZ .....**

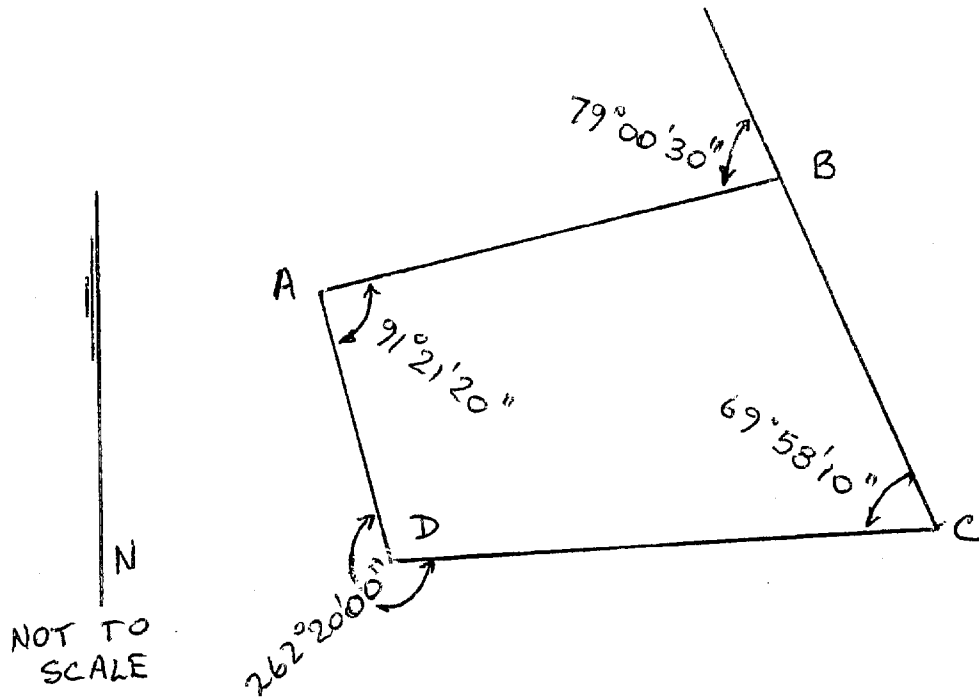
- c) Vertical Circle readings were made to Points Y and Z. Determine the mean angle of elevation or depression to each target. (4 Marks)

| Target | Face | Observed Vert Circ | Vertical Angle | Mean Vertical Angle |
|--------|------|--------------------|----------------|---------------------|
| Y      | FL   | 88° 58' 00"        |                |                     |
|        | FR   | 271° 03' 00"       |                |                     |
| Z      | FL   | 92° 35' 30"        |                |                     |
|        | FR   | 267° 24' 50"       |                |                     |

**QUESTION 6 (16 Marks)**

Calculate the adjusted bearings of the traverse lines in the diagram shown below.

The Azimuth of the Survey is line A – B whose bearing is  $80^{\circ} 22' 30''$



Angular Misclose .....

AB ..... BC .....

CD ..... DA .....