NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF CIVIL AND WATER ENGINEERING
FACULTY OF INDUSTRIAL TECHNOLOGY
BACHELOR OF ENGINEERING (HONOURS) DEGREE
PART II SUPPLEMENTARY EXAM.-SEPT. 2008
ENGINEERING SURVEY II TCW 2204

INSTRUCTIONS

Answer any four questions

Time : 3 hours
Total Marks : 100

QUESTION 1

Describe the Zimbabwean survey coordinate system.(25 marks)

QUESTION 2

Fig. 2 shows a link traverse that was run from points Z and Y. Given the following information ;

Coordinates (m)

Z	+ 9 328,110	+ 2 164,470
Y	+ 5 526,770	+ 5 449,490

Observed horizontal angles	Horizontal distances (m)
Y = 97^0 35' 28''	YX = 1950,350
X = 76^0 18' 00''	XR = 1473,800
R = 167^0 09' 46''	RS = 19,920
S = 125^0 31' 25''	ST = 738'400
T = 273^0 02' 58''	TU = 2508,090

Calculate the coordinates of points X , R , S , T and U (25 marks)

QUESTION 3

Point S was surveyed by sighting three trigonometrical beacons as shown in fig.3.

Given the following information:

Angle	Observed value
TSD	138^0 00' 30''
DSE	78^0 55' 30''
TSE	143^0 06' 00''

Coordinates (m)

D + 540,000	+ 180,000
E + 480,000	- 144,000
T + 25,800	+ 9,490

Calculate the provisional coordinates of point S. (25 marks)

QUESTION 4

Fig 4 shows a triangulation network. The following observed angles were obtained:

Angle	Observed Value
1	50^0 21' 19''
2	56^0 21' 41''
3	43^0 19' 39''
4	29^0 57' 24''
5	47^0 21' 36''
6	59^0 21' 36''
7	34^0 52' 11''
8	38^0 24' 45''

Adjust the observed angles for geometrical consistency . (25 marks)

QUESTION 5

ST and PR are two tracks to be joined by a curve of radius 860m.

GIVEN
Bearing S-T = 180^0 00' 00''

Coordinates(m)

T + 1 03255,400	- 3 255,600
P + 1 0855,500	- 4 295,800

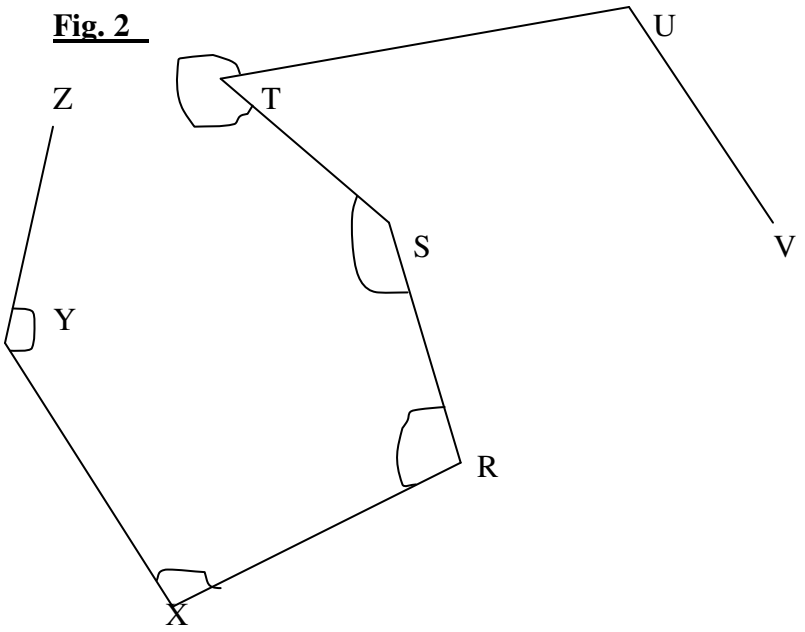
Calculate the coordinates of R. (25 marks)

List of formulae

$$\left| V'' \right| = \frac{a-c}{(ab + cd) \sin 1''}$$

a = Sin 1 x Sin 3 x Sin 5 x Sin 7
b = Cot 1 + Cot 3 + Cot 5 + Cot 7
c = Sin 2 x Sin 4 x Sin 6 + Sin 8
d = Cot 2 + Cot 4 + Sin 6 + Cot 8

Fig. 2



S

Fig. 3

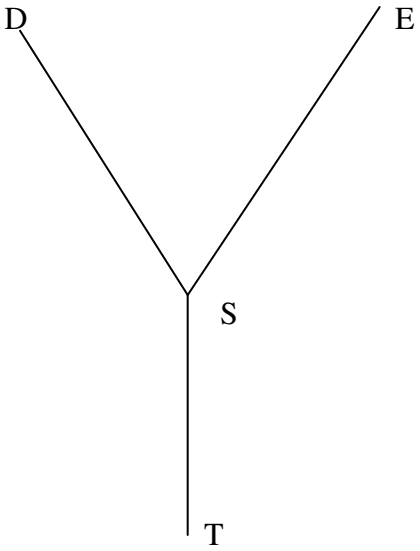


Fig.4

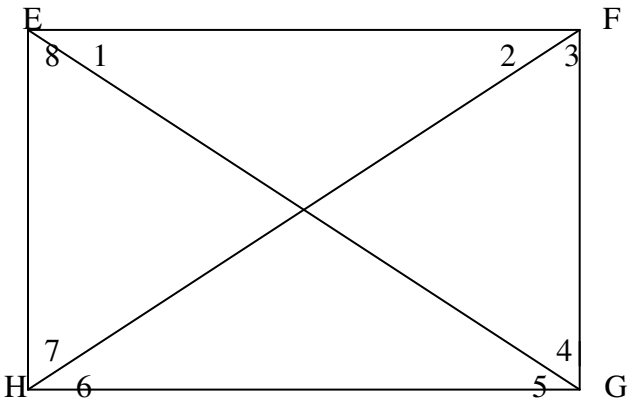


Fig. 5