

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF CIVIL AND WATER ENGINEERING

FACULTY OF INDUSTRIAL TECHNOLOGY

BACHELOR OF ENGINEERING (HONOURS DEGREE)

PART II SECOND SEMESTER SUPPLEMENTARY EXAM. – AUGUST 2014

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)

(25 marks)

QUESTION 2

The area of a construction site is to be enlarged by including a new boundary peg E as shown in fig.2. Given the following information below :

Coordinates (m)

Bearings

A + 2 384,860 - 1 178,010

A – E = $166^{\circ} 36' 40''$

B + 742,500 - 2 532,360

B – E = $115^{\circ} 42' 40''$

C + 770,450 - 1 454,810

D + 1 638,490 - 638,340

QUESTION 2continued

Calculate the coordinates of peg E and the new area of the construction site.(25 marks)

(25 marks)

QUESTION 3

Fig. 3 shows the control pegs on a construction site. A traverse was run in order to coordinate the pegs . The following information was obtained :

Internal horizontal angles	Side lengths (m)
BAE = $115^{\circ} 45' 30''$	BA = 397,210
CBA = $88^{\circ} 13' 50''$	CB = 251,350
DCB = $101^{\circ} 52' 40''$	DC = 276,110
EDC = $137^{\circ} 09' 10''$	ED = 238,070
DEA = $96^{\circ} 59' 40''$	AE = 189,820

Given

Coordinates (m)

A +1 500,000 + 1 000,000

Bearing A – B = $48^{\circ} 10' 00''$

Calculate the adjusted coordinates of the rest of the pegs. (25 marks)

(25 marks)

QUESTION 4

Write about the following were setting out is concerned :

(a) aims of setting out .

(4 marks)

QUESTION 4continued

(b) plans (8 marks)

(c) reference grids (13 marks)

(25 marks)

QUESTION 5

A B and ED are the centre lines of two straight portions of a railway track which are to be connected by a compound curve BRE as shown in fig. 5. BR is one circular curve and RE the other. Given the following information :

Coordinates (m)

B + 440,000 + 150,000

E + 50,000 + 500,000

Bearings

A – B = $348^{\circ} 30' 00''$

E – D = $264^{\circ} 30' 00''$

Radius of curve BR = 500m . Calculate the coordinates of R .

(25 marks)

(25 marks)

QUESTION 6

A and B are two fixed points through which it is required to pass a reverse curve ATB of equal radii as shown in fig. 6. Given the following information :

Coordinates (m)

A + 4097,260 + 2134,910

B + 2798,220 + 1384,910

Bearings

C – A = $2100 00' 00''$

B – D = $2200 00' 00''$.

Calculate the coordinates of the common tangent point T.

(25 marks)

(25 marks)

Diagrams

Fig.2

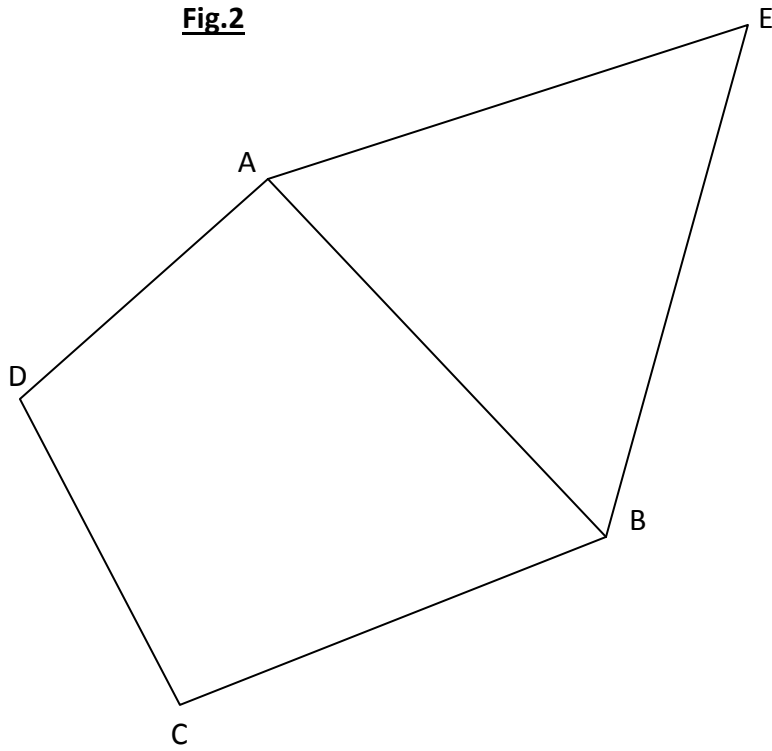


Fig. 3

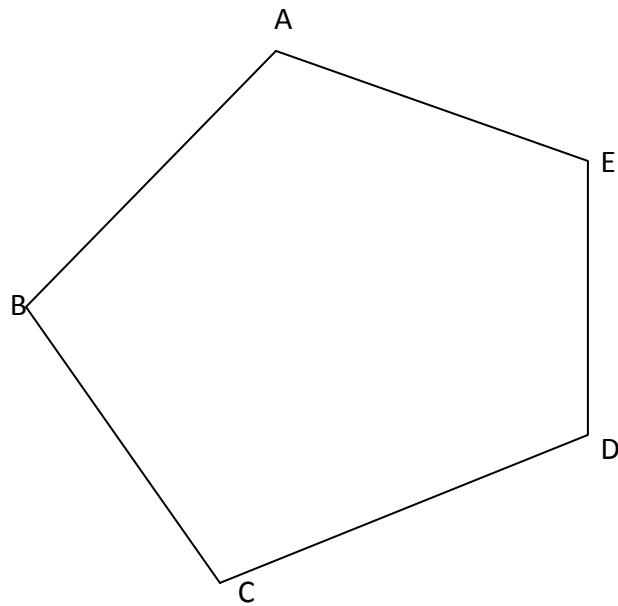


Fig.5

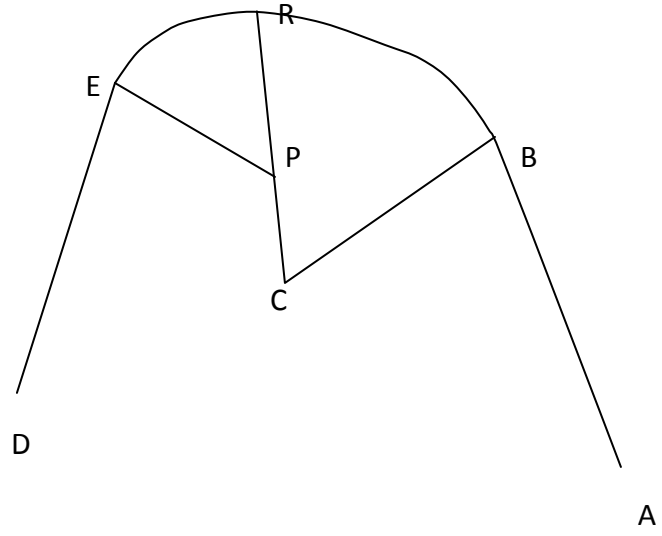
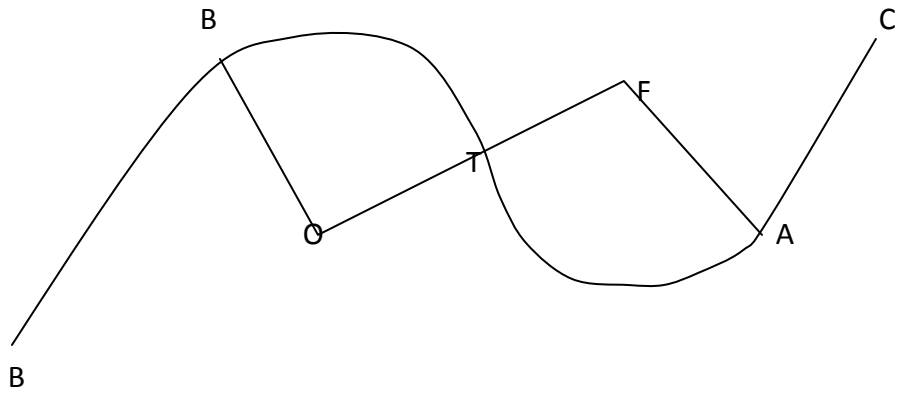


Fig.6



List of formulae

$$\text{Sum of angles} = (2n - 4) \times 90^{\circ}$$

$$\text{Sum of angles} = (2n + 4) \times 90^{\circ}$$

$$\delta_y \text{ (or } \delta_x) = \pm e_y \text{ (or } e_x) \times \frac{\text{length of traverse leg concerned}}{\text{total length of traverse}}$$