



KENYATTA UNIVERSITY
UNIVERSITY EXAMINATIONS 2011/2012
SECOND SEMESTER EXAMINATION FOR THE DEGREE OF
BACHELOR OF SCIENCE IN CIVIL ENGINEERING
ECV 304: SURVEYING III

DATE: WEDNESDAY, 18TH APRIL 2012

TIME: 11.00 A.M. – 1.00 P.M.

INSTRUCTIONS

This paper contains 5 questions

Answer QUESTION ONE and ANY OTHER TWO

Where appropriate, assume Young's modulus (E) for steel is 200 kN mm^{-2} and the coefficient of thermal expansion of steel (α) is $0.0000112 \text{ per } ^\circ\text{C}$

QUESTION 1

- a) An area of land is bounded by straight sides in the shape of a five-sided clockwise polygon ABCDEA. It is required to split the area into two equal parts by erecting a fence, which is to run in a straight line from point C to a point F, which lies on side EA. A traverse is run around the area and the coordinates of A, B, C, D and E are calculated as follows

Point	mE	mN
A	679.11	775.87
B	826.93	807.32
C	1010.75	711.89
D	985.54	487.66
E	802.38	364.91

Calculate the length of the fence that should be erected

(15 Marks)

- b) An irregular shaped piece of land, which is known to occupy an area of 7956 m^2 is measured on a plan using a planimeter and a value of 5092 mm^2 is obtained. Calculate the scale of the plan.

(5 Marks)

- c) With reference to mass haul diagrams, explain what is meant by the following terms:

i. Free haul distance

(2 Marks)

ii. Overhaul distance

(2 Marks)

- iii. Haul (2 Marks)
 iv. Waste (2 Marks)
 v. Borrow (2 Marks)

QUESTION 2

The centre line of a proposed road of formation width 12.00 m is to fall at a slope of 1 in 100 m from chainage 50 m to chainage 150 m.

The existing ground levels on the centre line at chainages 50 m, 100 m and 150 m are 71.62 m, 72.34 m and 69.31 m, respectively, and the ground slopes at 1 in 3 at right angles to the proposed centre line.

If the centre line formation level at chainage 50 m is 71.22 m and the side slopes are to be 1 in 1 for cut and 1 in 2 for fill, calculate the volumes of cut and fill between chainages 50 m and 150 m. (20 Marks)

QUESTION 3

- a) A 4.56° circular curve is to be designed to fit between two intersecting straights. What is the radius of this curve? (5 Marks).
 b) It is required to connect two intersecting straights whose deflection angle is $13^\circ 16' 00''$ by a circular curve of radius 600 m. the through chainage of the intersection point is 2745.72 m and pegs are required on the centre line of the curve at exact 25 m multiples of through chainage.
 Tabulate the data necessary to set out the curve by the tangential angles method using a theodolite and a tape. (15 Marks)

QUESTION 4

At a resection point P, the following horizontal angles were observed to three control points L, M and N:

$$\text{Angle LPN} = 112^\circ 15' 03''$$

$$\text{Angle NPM} = 126^\circ 42' 41''$$

$$\text{Angle MPL} = 121^\circ 02' 16''$$

The coordinates of L, M and N are

Point	mE	mN
L	571.895	684.528
M	613.076	439.187
N	780.004	644.132

Calculate the coordinates of point P

(20 Marks)

In a project for which a section of the mass haul diagram is shown in the figure below, the free haul distance is specified as 100 m. Calculate the cost of earth-moving in the section between chainages 100 m and 400 m if the charge for moving the material within the free haul distance is KES A per m^3 and that for moving any overhaul is KES B per m^3 m. (20 marks)

area of (J + K + L + M) = 396000 m³ m
area J = 181300 m³ m



