



MACHAKOS UNIVERSITY

University Examinations 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

SECOND YEAR SECOND SEMESTER EXAMINATION FOR BACHELOR OF
SCIENCE IN CIVIL ENGINEERING

ECV 206: SURVEYING II

DATE: 13/6/2017

TIME: 8.30-10.30 AM

INSTRUCTIONS

- This paper comprises of **five** questions
- Question **one** is **compulsory** and carry 30 marks
- Answer any **other two** questions

QUESTION ONE (30 MARKS)

- a) Define the following terminologies as used in surveying (6 marks)
- i. Resection
 - ii. Intersection
 - iii. Reliability
- b) Describe the three types of traverses used to establish survey controls (3 marks)
- c) With the aid of well labelled diagrams, describe the principle behind the stadia method in tachometry (10 marks)
- d) A traverse ACDB was surveyed by theodolite and tape. The lengths and bearings of the lines AC, CD and DB are given below:

Line	AC	CD	DB
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Length (m)	480.6	292	448.1
Bearing	25° 19'	37° 53'	301° 00'

If the coordinates of A are $x = 0$, $y = 0$ and that of B are $x = 0$, $y = 897.05$, adjust the traverse and determine the coordinates of C and D. The coordinates of A and B must not be altered. (4 marks)

- e) Describe how a control point could be obtained using the intersection method (7 marks)

QUESTION TWO (20 MARKS)

- a) Outline the methods used in the establishment of the survey controls (4 marks)
- b) Outline the computation steps in a traverse (8 marks)
- c) Explain how the coordinates of a point can be determined by observations to known points. (8 marks)

QUESTION THREE (20 MARKS)

- a) Distinguish between the precision and reliability as used in measurement (2 marks)
- b) What do you understand by tacheometry as used in surveying? (1.5 marks)
- c) Outline seven uses of tacheometric methods (3.5 marks)
- d) Explain the basic features of a typical theodolite (13 marks)

QUESTION FOUR (20 MARKS)

- a) Describe the steps involved in setting up a theodolite (7 marks)
- b) Outline the sources of error in traversing (3 marks)
- c) The coordinates of A, B and C in the figure below are:

E_A 1234.96m N_A 17 594.48m

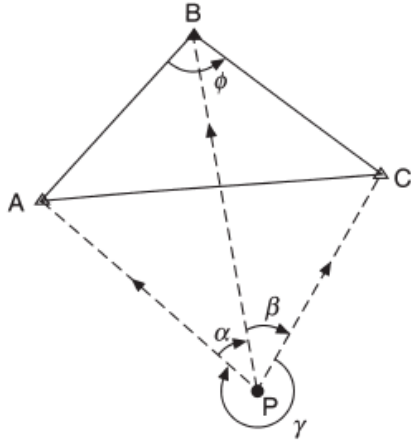
E_B 7994.42m N_B 24 343.45m

E_C 17 913.83m N_C 21 364.73m

And the observed angles are:

$APB = \alpha = 61^\circ 41' 46.6''$

$BPC = \beta = 74^\circ 14' 58.1''$



Find the coordinates of P.

(10 marks)

QUESTION FIVE (20 MARKS)

A link traverse below commences from known stations, A and B, and connects to known stations C and D. The bearing of the link AB is $151^{\circ}27'38''$ and that of CD is $347^{\circ}37'41''$. The observed angles and distances are as in the table below.

Station	Observed angle	Line	Distance (m)
B	$143^{\circ}54'47''$	B- E ₁	651.16
E ₁	$149^{\circ}08'11''$	E ₁ - E ₂	870.92
E ₂	$224^{\circ}07'32''$	E ₂ - E ₃	522.08
E ₃	$157^{\circ}21'53''$	E ₃ - E ₄	1107.36
E ₄	$167^{\circ}05'15''$	E ₄ - C	794.35
C	$74^{\circ}32'48''$		

Given that the coordinates of point B & C are (3854.28, 9372.98) & (7575.56, 8503.21) respectively, compute the adjusted coordinates of points E₁, E₂, E₃, E₄. (20 marks)