



MACHAKOS UNIVERSITY

University Examinations for 2021/2022 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

SECOND YEAR SPECIAL / SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE (CIVIL ENGINEERING)

ECV 206: SURVEYING II

DATE: 30/8/2022

TIME: 2.00-4.00 PM

INSTRUCTIONS:

- This paper comprises of FIVE questions. Answer **THREE** 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)
- Resection
 - Intersection
 - 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 tacheometry (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
Length (m)	480.6	292	448.1
Bearing	$25^{\circ} 19'$	$37^{\circ} 53'$	$301^{\circ} 00'$

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 using the resection method (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

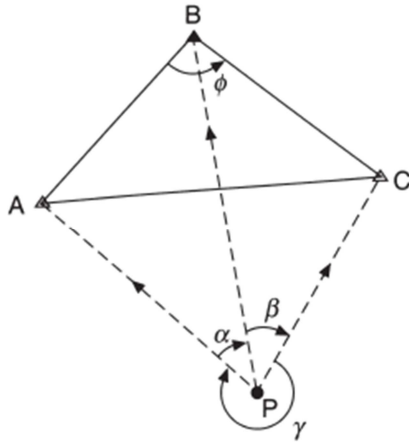
E_B 7994.42m N_B 24 343.45m

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 E_1 , E_2 , E_3 , E_4 .