



MACHAKOS UNIVERSITY

University Examinations for 2021/2022

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

SECOND YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR IN CIVIL ENGINEERING

ECV 206: SURVEYING II

DATE:

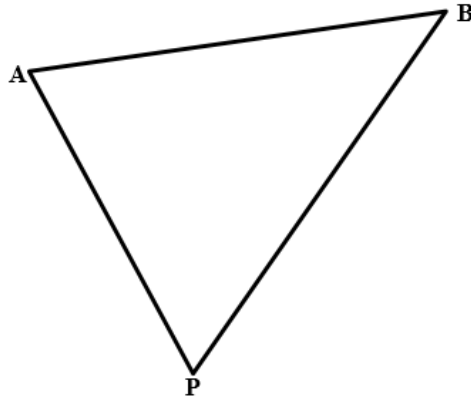
TIME:

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 (COMPULSORY) (30 MARKS)

- What do you understand by the 'tacheometry' as used in surveying? (1.5 marks)
- Distinguish between the precision and reliability as used in measurement (2 marks)
- Describe the three types of traverses used to establish survey controls (3 marks)
- Outline seven uses of tacheometric methods (3.5 marks)
- In the figure below, A and B have coordinates 1870.74mE, 953.56mN and 2013.53mE, 1020.23mN respectively. Determine the coordinates of P if, distance AP and BP have been measured by EDM as 143.94m and 178.08m respectively. (6 marks)



- f) With the aid of well labelled diagrams, describe the principle behind the stadia method in *tacheometry* (10 marks)
- g) A traverse *ACDB* was surveyed by theodolite and tape. The lengths and bearings of the lines *AC*, *CD* and *DB* are given below:

<i>Line</i>	<i>AC</i>	<i>CD</i>	<i>DB</i>
<i>Length (m)</i>	480.6	292	448.1
<i>Bearing</i>	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)

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) Describe how a control point could be obtained using the intersection method (7 marks)
- b) Explain the basic features of a typical theodolite (13 marks)

QUESTION FOUR (20 MARKS)

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

E_A 1234.96m N_A 17 594.48m

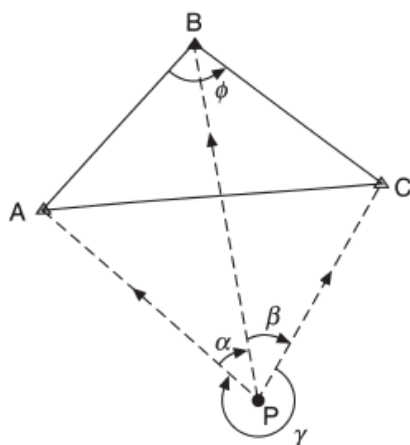
E_B 7994.42m N_B 24 343.45m

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 .