MACHAKOS UNIVERSITY

University Examination for 2021/2022 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY
UNIVERSITY
DEPARTMENT OF BUILDING AND CIVIL ENGINEERING
SECOND YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR
BACHELOR OF SCIENCE (CIVIL ENGINEERING)
ECV 206: SURVEYING II

DATE: TIME:

INSTRUCTIONS
This paper comprises of FIVE questions. Answer **THREE** questions
Questions one is **Compulsory** and carries 30 marks
Answer any other **TWO** questions

QUESTION ONE (30 MARKS)

a) Define the following terms as used in surveying :
   i.   Triangulation
   ii.   Traversing
   iii.   Resection   (6 marks)
b) Describe Two methods of adjusting a theodolite.   (4 marks)
c) Describe the basic principle of optical distance measurements in surveying.
                                                                                         (4 marks)
d) The constants f/i and (f+d) of a certain tacheometer were 100 and 0.3 respectively. The readings of the three diapragm-hairs on a staff held at a distant object were found to be 1.16, 2.40, 3.44, the telescope being horizontal. Find the horizontal distance of the staff from the instrument axis and the R.L. of the staff point, if the R.L. of instrument axis is 80.00m.   (6 marks)
e) In order to determine the constants of a tacheometer, two distances 201m and 400m were accurately measured from the instrument and readings on a Stadia rod on the upper and lower wires were taken as follows:

Distance in meters	Lower Stadia	Upper Stadia
201	2.00	4.00
400	0.50	4.50

Determine the values of the constants and find the distance when the readings of the stadia wires were 1.5 m and 4.5 m. The line of sight being horizontal in all cases.

(10 marks)

QUESTION TWO (20 MARKS)

a) Outline methods used in measuring horizontal angles in theodolite surveying (6 marks)
b) A straight tunnel is to run between two points A and B whose net co-ordinates are given in the table below:

Point	Independent coordinates	
	N	E
A	0	0
B	3014	256
C	1764	1398

It is desired to sink a draft at D, the middle point of AB, but it is impossible to measure along AB directly, so D is to be fixed from C, a third known point:
Calculate:
a) The net Coordinates of D.
b) The length and bearing of CD.
c) The angle ACD, given that the whole circle bearing of AC is 38° 24'.

(14 marks)

QUESTION THREE (20 MARKS)

a) Differentiate between vernier and micrometer Theodolite   (4 marks)
b) Describe the main steps in setting up of a theodolite   (6 marks)
c) The following notes refer to a part of a traverse survey:

Line	Length in metres	Bearing
AB	686	352° 24'
BC	1824	24° 36'
Cd	1053	147° 30'

Calculate the distance between a point E on AB, 286 m from A and a point F on CD 650 m from C.   (10 marks)

QUESTION FOUR (20 MARKS)

a) Describe Five essential characteristics of a tacheometer   (5 marks)
b) Describe the major steps of conducting tacheometric survey   (5 marks)
c) The following notes refer to a line which has been leveled tacheometrically with a techeometer fitted with an anallatic lens, the multiplying constant being 100.

Instr. Stn.	Height of axis	Staff station	Vertical Angle	Hair Reading	Remarks
P	1.50	B.M	-6° 12´	0.963, 1515, 2.067	R.L of B.M
P	1.50	Q	+7° 5´	0.819, 1.541, 1.863	= 360.000
Q	1.60	R	12° 27´	1.860, 2.445, 3.030	Staff being held vertically

Compute the R.Ls. of P, Q and R, and the horizontal distances PQ and QR   (10 marks)

QUESTION FIVE (20 MARKS)

a) With aid of sketch describe the general principle of Stadia Tacheometry (5 marks)
b) Describe THREE classified sources of error in Theodolite work   (7 marks)
c) A stadia tacheometer is sighted upon a staff held vertically upon a point A. The telescope is transmitted and a point B is marked in the line of sight and readings are taken on staff held vertically at that point. If the multiplying and additive constants are 100 and 0 respectively, compute the horizontal distance from A to B and the difference of level between these points. The notes of observations being as follows:

Staff point	Vertical angle	Staff readings in m
A	-7° 42'	1.29, 2.00, 2.70
B	+12° 36'	1.00, 1.75, 2.50

                                                               (8 marks)