MACHAKOS UNIVERSITY

University Examination 2020/2021 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

THIRD YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE (CIVIL ENGINEERING)

ECV 304 SURVEYING III

DATE: 24/3/2021 **TIME: 2.00-4.00 PM**

INSTRUCTIONS: Answer questions **ONE** and any other **TWO** questions

QUESTION ONE (30 MARKS)

a) Outline the principle behind the rate of approach stating its application in route location (4 marks)

b) The Volumes in cubic meters of excavation (+) and fill (−) between successive sections 100 m apart on a 1300-m length of a proposed railway are given.

Section	0	1	2	3	4	5	6	7
Volume (m^3)	−1000	−2200	−1600	−500	+200	+1300	+2100	
Section	7	8	9	10	11	12	13	
Volume (m^3)	+1800	+1100	+300	−400	−1200	−1900		

i. Draw a mass haul diagram for this length.

ii. If earth may be borrowed at either end, which alternative would give the least haul? (6 marks)

c) With the aid of a clearly labelled diagram, derive the formula for the Apex distance in curves. (4 marks)

d) Two straights, with a deflection angle of 36°, are to be joined with a circular curve of 500m radius. The forward chainage of the Intersection Point is 6051.35m. Compute the setting-

out data required for chords of 20m length. (16 marks)

QUESTION TWO (20 MARKS)

a) Define the following terms as used in computation of earthworks (8 marks)

i. Haul

ii. Waste

iii. Borrow

iv. Limit of economical haul

b) Outline the methods used in the establishment of the survey controls (4 marks)

c) Describe the principle of operation of a planimeter (8 marks)

QUESTION THREE (20 MARKS)

a) Describe how a control point could be obtained using the intersection method (6 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

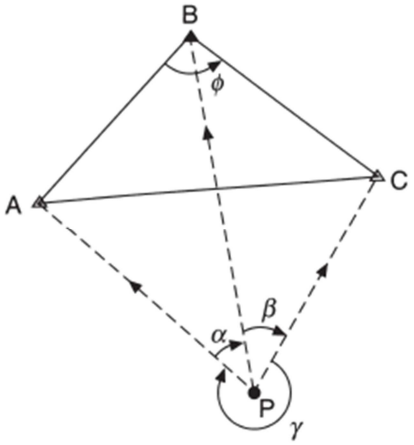
E_B 7994.42m N_B 24 343.45m

E_C 17 913.83m N_C 21 364.73m

And the observed angles are:

APB = α = 61° 41' 46.6''

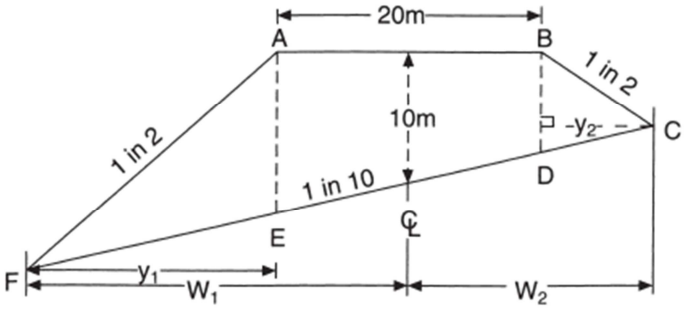
BPC = β = 74° 14' 58.1''



d) Find the coordinates of P. (11 marks)

QUESTION FOUR (20 MARKS)

a) In the figure below, the line AB defines the road formation level to be attained and the line FC defines the existing ground level.



Compute the area of the fill and the side widths W_1 and W_2 (6 marks)

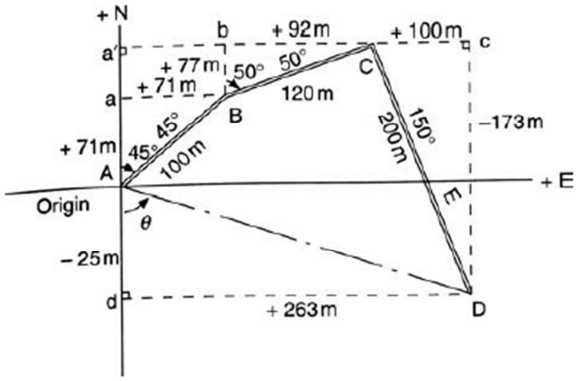
b) Outline two major needs of providing curves (2 marks)

c) Describe the properties of a mass haul diagram (12 marks)

QUESTION FIVE (20 MARKS)

a) Compute the area of the polygon ABCD by coordinates. Then carry out a check of the area by using the geometric shapes (6 marks)

Figure



Coordinates

Stns	*E*	*N*
A	0.0	0.0
B	71	71
C	163	148
D	263	−25
A	0.0	0.0

b) Derive Simpson's Rule method of area estimation (7 marks)

c) Outline the procedure of running a traverse (7 marks)