MACHAKOS UNIVERSITY

University Examinations for 2021/2022 Academic Year

DIRECTORATE OF TVET

THIRD YEAR FIRST TERM EXAMINATION FOR

DIPLOMA IN BUILDING TECHNOLOGY

DIPLOMA IN CIVIL ENGINEERING

2705 & 2707 / 301: SURVEYING III

DATE: 27/7/2022 **TIME: 2:30 – 5:30 AM**

INSTRUCTIONS

***Instructions**; the paper contains **five** questions answer **all** questions*

QUESTION ONE

a) Define the term tacheometry. (2 marks)

b) State ***three*** features of a tacheometer. (3 marks)

c) Table 1 shows readings on a staff held on points P and Q from an instrument set up at point K.

Table 1

Station	Staff position	Staff reading	Vertical angle
K	P	1.000	$+4^0$ 13' 30''
		3.000	$+5^0$ 58' 30''
	Q	2.150	-2^0 31' 30''
		0.150	-4^0 57' 20''

If the height of the instrument held at K is 37.360m above datum, and the instrument is fitted with an anallactic lens, calculate:

i) Horizontal distances KP and KQ.

ii) Difference in height between P and Q. (15 marks)

QUESTION TWO

a) Differentiate between the following terms as used in earthworks:

i) Haul and average haul distance.

ii) Waste and borrow. (6 marks)

b) Outline the procedure of carrying out earth works. (8 marks)

c) Sketch and label three types of cross sections used in earthworks (6 marks)

QUESTION THREE

a) Explain two systems of tacheometric measurements. (4 marks)

b) A theodolite has a multiplying constant of 100 and an additive constant of 0. The center reading on a vertical staff held at point P is 3.292m when sighted from point A. If the vertical angle is 30^0 and the horizontal distance is 200.236m determine the following:

i. The upper and lower staff reading to prove that the two intercept intervals are not equal.

ii. The reduced level at point P if that of point Q is 237.950m and the height of the instrument is 1.450m. (16 marks)

QUESTION FOUR

a) State ***Four*** sources of error in horizontal distances determined by vertical stadia tacheometry. (4 marks)

b) Outline the procedure of determining tacheometric constants for a theodolite. (6 marks)

c) Table 3 shows observations taken with a theodolite fitted with an anallactic lens to a vertically held staff. The theodolite had a multiplying constant of 100.

If the height of the instrument was 1.500m, the reduced level of N 1095.340m and point N, M and P are collinear, calculate the gradient of NP. (10 marks)

Table 3

Theodolite Station	Staff Station	Vertical angle	Staff reading (m)		
M	N	$+4^0$ 30' 15''	2.195	1.400	0.605
	P	-2^0 45' 30''	2.885	2.345	1.805

QUESTION FIVE

a) Explain ***Two*** methods used in determining area in earthworks. (4 marks)

b) Describe the construction of a mass haul diagram. (6 marks)

c) Figure 1 shows the profile along a proposed road construction.

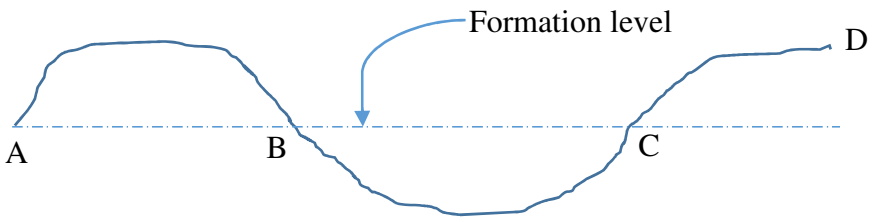

Fig. 1

c) Sketch the figure and show the following:

i. The corresponding mass haul diagram.

ii. Maximum and minimum points of the mass haul diagrams.

iii. Excess material within the section. (10 marks)