TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR THE BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING

TCV 4214: ENGINEERING SURVEY - I

SPECIAL/SUPPLEMENTARY EXAMINATION
SERIES: JULY 2025
TIME: 2 HOURS

DATE:

Instructions to Candidates

You should have the following for this examination
-Answer Booklet, examination pass and student ID
-Drawing instruments.
This paper consists of five questions.
Attempt any THREE questions.
Do not write on the question paper.

QUESTION ONE (Compulsory) (20 Marks).

a). You have been given the task of conducting linear surveying. Along your survey line, you encounter a big river. Discuss any method of overcoming obstruction (**6 Marks).**

b). The groups of figures below refer to staff readings taken with a level from instrument stations, A, B, C, D and E. The first and the last readings in each group are the backsight and foresight respectively. The backsight from station A was taken with the staff held on a bench mark at 204.11m above the datum. A (2.680, 0.875, 0.980, 0.430; B (1.665, 1.440, 0.625); C (1.010, 1.690, 1.225); D (2.445, 3.575, 3.880, 2.280); E(2.735, 2.005, 2.390) 14 **Marks).**

ANSWER ANY QUESTION FROM THIS SECTION

QUESTION TWO (20 Marks).

a). A 30 m bay of a baseline was measured using a 30 m steel band that had been standardized in a catenary at a tension of 65 N and a temperature of 20°C. The following informationwas obtained:

- Applied tension = 90 N
- Temperature in the field =15°C
- The radius of Earth's curvature = 6370 000- m
- The differences in height between the two points = 0.62 m
- The altitude of the base = 2000 m above sea level
- Cross-sectional area of the tape = 3.6 mm^2
- Young Modulus of Elasticity (E) = $2.1*10^{11}$ N/mm^2
- Coefficient of Linear Expansion (α) = $11*10^{-6}/^0C$
- Mass of the tape = 0.036 Kg/m

Determine the five-correction applied on the steel tape **(12 Marks).**

b). Derive the equation for curvature and refraction combine given by the following:

$C \ \& \ R = 0.0673L^2$

Where:

$L = is\ the\ length\ of\ sight\ in\ Kilometres$ …… **(8 Marks).**

QUESTION THREE (20 Marks).

a). Discuss factors affecting the choice of vertical interals in contouring **(6 Marks).**

b). Giving examples, discuss gross error as in levelling **(10 Marks)**

c). Two points X and Y were 700 m apart. A level was set up at X and Y in turn and the following readings were taken: Level at X. Height of Collimation read 1.708 m. Reading of the staff on Y was 1.695 m. Level at Y. Height of Collimation read 1.625 m. Reading of the on X was recorded as 1.675 m. Calculate the reduced level of point Y if the reduced level of X is 100.04 m A.O. D **(4 Marks).**

QUESTION FOUR (20 Marks).

a). Discuss the process of Pythogrean Theorem of obtaining right angles **(12 Marks).**

b). Define the following terms as used in levelling

i). Back Sight (B.S)

ii). Fore Sight (F.S)

iii). Reduced level (R.L)

iv). Change Point (C.P) **(8 Marks).**

QUESTION FIVE (20 Marks).

a). Outline the process of reccoinassance **(5 Marks).**

b). Discuss ANY five application of cross – sections **(5 Marks).**

c). Make short notes under the following equipment

- Tapes
- Chains
- Ranging rods
- Marking arrows
- Cliometer **(10 Marks).**