



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY

Department of BUILDING & Civil engineering

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN CIVIL ENGINEERING

DCE 2302: SURVEYING IV

SPECIAL / SUPPLEMENTARY EXAMINATION

SERIES: JULY 2025

TIME: 2 HOURS

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **five** questions.

Attempt any **THREE** questions.

Do not write on the question paper.

QUESTION ONE (20 Marks)

- a) Define the following term in relation to setting out of works
- i) setting out
 - ii) horizontal control
 - iii) works control (6 Marks)
- b) Differentiate between setting out and as-built plans. (4 Marks)
- c) With the aid of a sketch, describe the centre-line axes method of verticality control of tall structures. (10 Marks)

QUESTION TWO (20 Marks)

- a) State the aims of drawing longitudinal sections in the setting out of pipelines. (6 Marks)
- b) State the **THREE** points to be considered when placing the reference marks in setting out. (3 Marks)
- c) A level basket-ball pitch is to be excavated to a uniform formation level of 49.50m above mean sea level (AMSL). A level was set out at a point P and a reading of 1.511m observed on a TBM of 49.000m:
- Calculate the required staff reading for fixing pegs to define the formation level.
 - Explain, with the aid of a labeled sketch, the setting out procedure of placing pegs to define the uniform formation level of 49.00m. (10 Marks)

QUESTION THREE (20 Marks)

Sight rails are to be placed at three manhole positions A, B and C such that $AB = 100$, $BC = 90$ m. In order to fix the tops of sight rails a level was set up nearby and a reading of 1.601 m obtained with the staff held on a TBM of reduced level of 167.12m. The ground reduced levels at A, B and C being 167.76, 166.55m and 165.02m respectively.

A sewer is to be laid at a falling gradient of 1: 120, and 1: 110 between manholes A and B, and B and C respectively. If the invert reduced level at manhole A is 166.43m and a 3.5m traveler is available, calculate:

- The invert reduced level at manholes B and C.
- The staff readings necessary at A, B and C to position sight rails at these points.
- The depths of dig at A, B and C.
- The height of the sight rails above the ground at A, B and C. (20 Marks)

QUESTION FOUR (20 Marks)

A rectangular building having plan sides of 80.0m by 40.0m is to be set out with its major axis aligned precisely east west on a co-ordinate system. Co-ordinates of the SE corner have be fixed as (596.67mE, 498.64mN) and this corner is to be fixed by theodolite intersection from two points A and B whose respective co-ordinates are (796.51mE, 1040.39mN) and (871.35mE , 1022.25mN).

Existing ground levels at the corners of the proposed structure were determined as follows:

SE(266.83m) , SW(259.71) ,NE(261.44m) , NW(256.55m).

Calculate:

- The respective clockwise angles to be set off at A relative to AB and at B relative to BA in order to intersect the position of the SE corner.

- (b) Surface setting out measurements for the two diagonals, assuming even gradients along all lines. (20 Marks)

QUESTION FIVE (20 Marks)

- a) Differentiate between thematic and cadastral maps (3 Marks)
- b) State any TWO uses of air-photographs. (3 Marks)
- c) Explain any TWO associated features which help in photo interpretation. (3 Marks)
- d) With the aid of a labeled sketch, describe the inclined sights theodolite method of verticality control of tall structures (11 Marks)