



TECHNICAL UNIVERSITY OF MOMBASA
**Faculty of Engineering &
Technology**

DEPARTMENT OF BUILDING & CIVIL ENGINEERING
DIPLOMA IN BUILDING & CIVIL ENGINEERING

EBC 2211: ENGINEERING SURVEYING III

END OF SEMESTER EXAMINATION

SERIES: APRIL 2013

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*

This paper consists of **FIVE** questions. Answer any **THREE** questions
Maximum marks for each part of a question are as shown
This paper consists of **THREE** printed pages

Question One

- a) With the aid of a sketch, describe the two-theodolites method of setting out simple circular curves. **(6 marks)**
- b) With the aid of sketches, explain how the following obstacles can be overcome in the setting out of circular curves.
- (i) Whole curve cannot be set out from the same tangent point
 - (ii) An obstacle intervenes on the curve. **(14 marks)**

Question Two

Figure 1 shows the information of a closed link traverse A, B, C, D, E. The datum co-ordinates and bearings are as follows:

$77^{\circ} 24' 42''$

Datum co-ordinates:

A: 1500.00mE, 2000.00mN
E: 1570.91mE, 1927.97mN

Datum whole circle bearings:

AB: $232^{\circ} 01' 42''$
DE: $159^{\circ} 19' 52''$

Calculate the co-ordinates of points B, C and D by the Bowditch's method. **(20 marks)**

Question Three

A circle curve 310.0m radius is to be set out to connect two intersecting straights deflecting at 30° . The chainage of the intersection point is +7576.00m. Given that the curve is to be set out by the method of offsets from chords produced for continuous chainage of 20m intervals, calculate the data for setting out the curve. **(20 marks)**

Question Four

A curve 119.0m radius is to be set out to connect two straight as shown in figure 2. As the intersection in point was inaccessible the distance DC was measured and the length and angles are as shown in the figure.

Given the chainage of intersection point as +2503.50m and the curve is to be set out by the through and through chainage basic, calculate:

- (a) The deflection angle at 'P'
- (b) The tangent distance DT1 and CT2
- (c) The length of the curve
- (d) The first THREE tangential angles for setting out the curve at 20m intervals.

P

Question Five

- a) Outline the main factors that justify the periodic inspection and maintenance of bridges. Identify the **THREE** main types of inspection carried on bridges and state the activities involved in each. Outline the activities carried out in the maintenance of bridge bearing and expansion joints. **(8 marks)**
- b) Figure 5(b) shows the plan and elevation of a four-pile cap. The characteristic strengths of the reinforcement and concrete are 425N/mm^2 and 30N/mm^2 respectively. The design loads at the ultimate limit is 52000KN. Using the bending theory, design the reinforcement to satisfy bending and shear. **(12 marks)**

C