TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR:

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

ECE 2202 : ENGINEERING SURVEY I

END OF SEMESTER EXAMINATION

SERIES: DECEMBER 2016

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)

a). Discuss Pythagorean Theorem as applied in the setting out of right angles to an object (9 Marks).

b). Define a contour (3 Marks).

c). Giving appropriate formulae, state **ANY** four major corrections that are applied to a steel band when taking linear measurements. A steel band of 30 m which has been standardized in a catenary at a tension of 70 N and at a temperature of 20 ^{0} C was used to measure a 40 m bay of a baseline. The following data was recorded:

- Measured length = 40 m
- Applied tension = 90 N
- The radius of Earth's curvature = 6370 Km
- The differences in height between the two points = 0.56 m
- The altitude of the base = 1500 m above sea level
- Cross sectional area of the tape = 5.0 mm^2
- Young Modulus of Elasticity (E) = $2.1*10^{11}$ N/mm^2
- Coefficient of Linear Expansion (α) = $12 *10^{-6}/^{0}C$
- Mass of the tape = 0.032 Kg/m

Determine the correct length of the bay reduced to mean sea level (14 Marks).

d). Differentiate between a **backsight** and **foresight** as used in levelling (4 Marks).

Question TWO

a). With an aid of a sketch, explain the parts of a tilting level (12 Marks).

b). Discuss how you would take measurements if there is a pond lying a long a survey line (8 Marks).

Question THREE

a). Explain the process of reciprocal levelling (10 Marks).

b). The group of figures below refer to staff readings taken with a level 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 200.00 m above the Ordinance Datum.

A: 2.780, 0.900, 0.430; **B**: 1.765, 1.450, 0.725; **C**: 1.020, 1.700, 1.325; **D**: 2.455, 3.560, 2.789

E: 2.745, 2.005, 2.400

Book the readings by the height of instrument method, determine the reduced levels of each staff station and apply the appropriate arithmetic checks (10 Marks).

Question FOUR

a). What factors should one consider in choosing vertical intervals in contouring (6 Marks)

b). Discuss gross errors in levelling (10 Marks).

c). In levelling a cross a river, the observations made gave the following results for the staff held vertically at points X and Y from the level stations A and B on each bank respectively:

- Staff reading of point X from A = 1.80 m
- Staff reading of point X from B = 2.11 m
- Staff reading of point Y from A = 2.60 m
- Staff reading of point Y from B = 2.90 m.

If the reduced level of X was 100 m, determine the reduced level of Y in metres (4 Marks).

Question FIVE

a). Discuss ANY ten characteristics of contours (10 Marks).

b). What is EDM? State advantages and disadvantages of using the instrument (8 Marks).

c), Mention the main causes of random errors (2 Marks).