AGEN 357

# EGERTON UNIVERSITY

## UNIVERSITY EXAMINATIONS

**NJORO CAMPUS**

**FIRST SEMESTER 2012/2013**

**THIRD YEAR EXAMINATIONS FOR THE DEGREE OF BACHELOR OF SCIENCE IN AGRICULTURAL ENGINEERING**

**AGEN 357: ENGINEERING SURVEYING**

**STREAM:** 2010 (Y3) B. SC. AGEN **TIME:** 2 hours

**DAY/TIME:** THURSDAY, 8.30 – 11.30 am **DATE:** 24/01/2013

**INSTRUCTIONS:**

1. The paper contains **FOUR (4)** questions.
2. Attempt **ALL** questions.
3. Shown in parenthesis are marks for each question.
4. Show all calculations where applicable.
5. Use neat and well labelled diagrams to illustrate your answers where applicable
6. **EACH QUESTION SHOULD BE STARTED ON A NEW PAGE.**

**QUESTION ONE**

**(a)** Define the term "**Engineering Surveying**" and state the factors and attributes the surveyor must consider while conducting his/her work. **(9 marks)**

**(b)** Describe the procedure for differential levelling. **(7 marks)**

**(c)** Describe how to carry out temporary adjustment of a Dumpy level and explain how parallax is removed. **(9 marks)**

## QUESTION TWO

**(a)** Define Bench Mark (BM) and state how it is accurately described in the field note book. **(3 marks)**

**(b)** The following are staff readings taken at 100 m interval of a centre line on a profile during terrace layout within a particular farm.

3.30 (at BM), 3.35, 3.38, 3.36, 3.34 3.37, 3.39, 3.40, 3.45, 3.48, 3.49, 3.50, 3.52, and 3.50.

If the elevation of the Bench Mark (BM1) was 2240.00 m above mean sea level and that the instrument was changed after Sixth and Eleventh readings:

(i) Enter the readings in a Standard booking sheet using both methods. **(10 marks)**

(ii) Determine the percentage slope and the horizontal distance if the slope distance between the BM and the last point is 291 m. **(2 marks)**

(iii) Carry out the usual checks. **(2 marks)**

After levelling a distance of 1100 m the surveyor realized that the calculated RL of BM2 was 2239.83 m while the control elevation of the same BM was 2239.84 m. Determine if the error is within the allowable limit.

**(c)** A strip of land is 960 m long. This length is marked off into eight equal intervals, and the consecutive breadths were measured at the ends of the interval as follows:

5, 13, 15, 18, 20, 24, 16, 6 and 5 m.

Calculate the area of the piece of land in Hectares using Simpson's and Trapezoidal rules. **(8 marks)**

## QUESTION THREE

**(a)** Define Plane table surveying and state its advantages and disadvantages. **(8 marks)**

**(b)** A steel tape of nominal length 30 m was used to measure a line AB by suspending it between supports. The following measurements were recorded.

| Line | Slope angle | Length measured | Mean temperature | Tension (N) |
|---|---|---|---|---|
| AB | $3^{\circ}\,40'$ | 29.872 m | 5 °C | 120 |

The standardized length of the tape against a reference tape was known to be 30.014 m at 20 °C and 50 N tension. If the tape weighs 0.17 $Nm^{-1}$ and has a cross-sectional area of 4 $mm^{-2}$, calculate the horizontal length of AB, given the Young's modulus ( E ) for the tape material is 200 $kNmm^{-2}$ and the coefficient of thermal expansion ($\alpha$ ) is 0.0000112 per °C. **(12 marks)**

**(c)** A 30 m chain was found to be 12 cm short after chaining 1256 m. The same chain was found to be 29.5 cm too short after chaining a total distance of 2895 m. Find the correct length of the

distance chained assuming the chain was correct at the commencement of chaining.

**(5 marks)**

## QUESTION FOUR

**(a)** The following are off-set distances made at eight equal intervals along a baseline of length 1120 m. 3.81, 4.37, 6.82, 5.26, 7.59, 8.90, 9.52, 8.42 and 6.43. Determine the area of the land in Hectares using Simpson's rule. **(8 marks)**

**(b)** (i) During the chain surveying, the third year students bumped onto a huge and wide rock. Explain how they could go through this using parallel diversion method. **(6 marks)**

(ii) Explain what is meant by step distance measurement. **(1 mark)**

(iii) List the **FOUR** types of meridian. **(2 marks)**

(iv) Briefly describe the **TWO** methods employed in designating a bearing. **(4 marks)**

(v) Define the terms back bearing and fore bearing and show how one can obtain back bearing from fore bearing of a line. **(4 marks)**

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