# EGERTON UNIVERSITY

## UNIVERSITY EXAMINATIONS

### NJORO CAMPUS

### FIRST SEMESTER 2012/2013

### THIRD YEAR EXAMINATIONS FOR THE DEGREES OF BACHELOR OF SCIENCE IN AGRICULTURE AND BACHELOR OF SCIENCE IN HORTICULTURE

### AGEN 352: SOIL AND WATER MANAGEMENT

**STREAM:** 2010 (Y3) B. SC. AGRIC/HORT      **TIME:** 3 hours

**DAY/TIME:** Friday, 03.00 – 06.00 pm      **DATE:** 11-01-2013

**INSTRUCTIONS:**

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

**QUESTION ONE**

**(a)** Distinguish between the following terms as used in surveying:

    (i)    Geodetic surveying and Plane surveying

    (ii)    Differential levelling and profile levelling

    (iii)    Systematic errors and accidental errors

    (iv)    Precision and accuracy          **(12 marks)**

**(b)** 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.

         **(6 marks)**

(c) 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 ha using Simpson's rule. ⋅ **(7 marks)**

## QUESTION TWO

(a) The following figures are staff readings taken in order during a levelling exercise: 0.813, 2.170, 2.908, 2.630, 3.133, 3.752, 3.277, 1.899, 2.390, 2.810, 1.542, 1.274 and 0.643.

The instrument position was changed after the fifth and the ninth readings were taken. The fourth reading was taken on a benchmark 2018.56 m. Enter the readings in level book form, check the entries, and find the reduced levels of all the points. Use the Rise and Fall method.

**(17 marks)**

(b) Define the following terms as used in surveying:

    (i) Off set

    (ii) Turning point

    (iii) Survey

    (iv) Azimuths                    **(8 marks)**

## QUESTION THREE

(a) The soil loss from a farm planted with beans was estimated to be 120 Mg $ha^{-1}yr^{-1}$ by the Universal Soil Loss Equation. If the field was 120 m long with a uniform slope of 12%, determine the soil loss from the field after terracing. Use the table below and assume that the cropping management remained constant.

Table Q3 (a): Control practice factor values:

| % slope | Contour Farming | Contour Farming + Strip cropping + Rotation of crops | Contour Farming + Terracing |
|---------|-----------------|------------------------------------------------------|------------------------------|
| 2 - 7 | 0.50 | 0.25 | 0.10 |
| 8 - 12 | 0.60 | 0.30 | 0.12 |
| 13 - 8 | 0.80 | 0.40 | 0.16 |

**(13 marks)**

(b) Briefly outline the uses of the universal soil loss equation     **(12 marks)**

## QUESTION FOUR

(a) (i) Differentiate between cut-off drain and artificial water way     **(5 marks)**

    (ii) Explain any **FOUR** forms of wind erosion     **(8 marks)**

    (iii) List **FOUR** forms of water erosion     **(4 marks)**

(b) Use the Kirpich formula to calculate the time of concentration of a surface runoff given a slope of 7% and with a length of 115 m. **(8 marks)**

**QUESTION FIVE**

(a) Define the following terms:

        (i)    Pedon

        (ii)   Weathering

        (iii)  Detention

        (iv)  Leaching                      **(8 marks)**

(b) At a given station, it was found that 250 mm of rainfall has a return period of 25 years. Determine the probability of one day rainfall which is equal to or greater than 250 mm, twice in 15 successive years. **(7 marks)**

(c) Outline the **FIVE** functions of soil. **(10 marks)**

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