



SOUTH EASTERN UNIVERSITY COLLEGE

(A CONSTITUENT COLLEGE OF THE UNIVERSITY OF NAIROBI)

UNIVERSITY EXAMINATIONS 2012/2013

**SECOND YEAR FIRST SEMESTER EXAMINATIONS FOR THE
DEGREE OF BACHELOR OF SCIENCE IN HYDROLOGY AND
WATER RESOURCES MANAGEMENT**

WRM 206: SOIL AND WATER CONSERVATION

Date: 9th August 2012

Time: 2 Hrs

Instructions:

*Answer **ALL** questions in Section A*

*Answer any **THREE (3)** questions in Section B.*

SECTION A (40 Marks)

1. Define the following terms **(8marks)**
 - I. Land capability classification
 - II. Rainfall erosivity
 - III. Soil erodibility
 - IV. Mass wasting

2. Differentiate between **(8marks)**
 - I. Accelerated and Geological erosion
 - II. Temporary and Permanent land limitation

3. a) Describe the characteristics of a standard plot that was used as an evaluation unit in the development of the factors of the Universal Soil loss Equation (USLE) **(4marks)**
b) Outline the factors that determine the nature and extent of wind erosion **(4marks)**

4. Briefly discuss the FOUR USDA land capability classification sub-classes **(8marks)**

5. Describe the steps that one will go through when installing conservation measures on agricultural land. **(8marks)**

SECTION B (60 marks)

6. During a 60minute storm, the following amounts of rainfall fell during successive 15 minute intervals: 33, 23, 15 and 5mm
 - i) Find the maximum intensity for 15minutes **(2marks)**
 - ii) Find the average intensity of the storm **(2marks)**
 - iii) Determine the total kinetic energy of the storm **(7marks)**
 - iv) Compute both the Wischmeier and Hudson erosion indices **(9marks)**

7. a) Discuss FIVE methods used in measurement/estimation of soil erosion **(15marks)**
b) Discuss FIVE forms of wind erosion **(5marks)**

8. a) Estimate the design peak runoff for a 10 year return period storm of a 400,000m² catchment with the following characteristics.
 - ✓ 15ha of cropland
 - ✓ 17ha of grazing land
 - ✓ The remaining land under forest
 - ✓ Maximum length of flow = 3753m
 - ✓ Difference in elevation = 3m
 - ✓ Runoff coefficient of crop land, grazing land and forest being 0.5, 0.29 and 0.2 respectively

Table 1: rainfall intensity duration relationship for a 10year return period

Rainfall intensity (mm/hr)	Rainfall duration (minutes)
20	60
40	45
60	25
80	20
100	15

- b) Discuss FIVE major effects of vegetation on soil erosion **(10marks)**
- (10marks)**
9. a) Outline THREE most important considerations in terrace design **(3marks)**
- b) A land owner was advised to lay out 14 terraces on his farm which measures 285m along the slope and 165m along the contour. Determine the average slope of the land if the vertical interval is 2.04m. **(6marks)**
- c) Discuss how runoff plots can be used in estimating soil erosion **(11marks)**
10. a) Give THREE reasons why structural measures of soil erosion control are usually confined to crop land **(3marks)**
- b) State SIX applications of the universal soil loss equation (USLE) **(6marks)**
- c) Discuss global spatial distribution of water erosion **(11marks)**