

**UNIVERSITY OF SWAZILAND
DEPARTMENT OF GEOGRAPHY, ENVIRONMENTAL SCIENCE AND
PLANNING
FINAL EXAMINATION, DECEMBER 2006**

TITLE OF PAPER: APPLIED SOIL SCIENCE

COURSE CODE: GEP 433

TIME ALLOWED: THREE HOURS

**INSTRUCTIONS: ANSWER QUESTION ONE AND ANY
OTHER TWO QUESTIONS FROM
SECTION B**

**MARKS ALLOCATED: QUESTION 1 CARRIES 40 MARKS. THE
OTHER QUESTIONS CARRY 30 MARKS
EACH.**

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BY THE INVIGILATOR**

SECTION A

QUESTION 1 (COMPULSORY)

Given the following hypothetical statistics for a location at Lubombo on Lomashasha silt loam which is clean-tilled and fallowed, with no cover or management practice to discourage erosion:

Rainfall erosivity factor	=	2550
Soil erodibility factor of Lomashasha silt loam	=	0.044.
Topographic factor of slope length and gradient	=	0.71

- a) Using the Universal Soil Loss Equation ($A = RKLSCP$), calculate the anticipated soil loss of this area (units = Mg/ha/yr). [5 marks]
- b) Assuming that the field is terraced, and that there is crop rotation involving corn-Soya beans-wheat. How would this affect the amount of soil loss in the area? Use hypothetical values to illustrate your explanation. [10marks]
- c) State the soil properties which determine soil erodibility factor. [5 marks]
- d) Explain how the following factors affect soil erosion.
- (i) Landscape surface roughness.
 - (ii) Climate.
 - (iii) Soil structural stability.
 - (iv) Soil infiltration capacity.

[20 marks]

[40 marks]

SECTION B

ANSWER ANY TWO QUESTIONS

QUESTION 2

- a) Discuss the objectives of soil classification. [10 marks]
- b) Critically discuss past and present systems of soil classification, highlighting their advantages and disadvantages. [20 marks]

[30 marks]

QUESTION 3

Discuss the main kinds of soil surveys and how they are applied in both developed and developing countries. [30 marks]

QUESTION 4

- a) Discuss the different mapping units used in soil survey. [20 marks]
- b) Explain the criteria and guidelines which guide the choice of mapping units in a soil survey. [10 marks]

[30 marks]

QUESTION 5

"The practical purpose of soil survey is to enable more numerous, more accurate and more useful predictions to be made for specific purposes than could have been made otherwise" (Dent and Young, 1981:1). Discuss the validity of this statement.

[30 marks]