



UNIVERSITY OF SWAZILAND
FINAL EXAMINATION PAPER

PROGRAMMES : BSC AGRICULTURAL AND BIOSYSTEMS
ENGINEERING YEAR III

COURSE CODE : ABE 301

TITLE OF PAPER: SOIL AND WATER CONSERVATION

TIME ALLOWED : TWO (2) HOURS

INSTRUCTIONS : ANSWER QUESTIONS ONE AND ANY TWO
OTHER QUESTIONS.

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GRANTED BY THE CHIEF INVIGILATOR.

SOIL AND WATER CONSERVATION

FINAL EXAMINATION

Question 1: Compulsory

- (a) Give and discuss two possible reasons why the study of soil and water conservation is important globally. **[10 marks]**

- (b) Briefly define the following terms and discuss their importance in the agriculture concept:-
 - (i) Porosity **[7.5. marks]**
 - (ii) Soil **[7.5. marks]**

- (c) Given the soil is irrigated by a rain gun sprinkler for 10 hours at a rate of 8.0 mm / hour. Two hours after irrigation (that is after the soil has drained all excess water) ninety percent of the moisture is retained by the soil and available for crop use. But the crop can only extract 6.0 mm per day. Calculate the field capacity, wilting point and available water **[15 marks]**

Question 2

- (a) Define the phrase “Time of Concentration” as used in run-off estimation in water conservation. **[7.5 marks]**

- (b) Name three main components of a soil sample and explain the importance of each in the agriculture concept. **[15 marks]**

- (c) List three main objectives of mechanical soil conservation works. **[7.5 marks]**

Question 3

- (a) What are the effects of soil erosion on water quality [10 marks]

- (b) Design a trapezoidal grass water way to convey a peak flow of $10.0\text{m}^3/\text{sec}$ on a 1% slope over a erodible soil with grass vegetation, which stands in a good stand cut to 5 cm height. The roughness coefficient is 0.035 and velocity of flow to be 2.0 m / sec. [15 marks]

- (c) Name two main agents of erosion. [5 marks]

Question 4

- (a) Briefly describe and discuss two types of water erosion and give two ways by which they can be controlled . [15 marks]

- (b) Describe in full how much affects soil moisture. [7.5 marks]

- (c) A sample of soil taken four after irrigation has a mass of 500g and a volume of 500 cm^3 . The particle density is 3.25g / cm^3 and the dry mass of 650g. Determine;
 - (i) Percentage water content. [2.5 marks]
 - (ii) Porosity [2.5 marks]
 - (iii) Void ratio [2.5 marks]