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UNIVERSITY OF ESWATINI
RESIT EXAMINATION PAPER

PROGRAMME: BSc AGRICULTURAL EDUCATION AND AGRICULTURAL EXTENSTIONYEAR 3

COURSE CODE: ABE301

TITLE OF PAPER: SOIL AND WATER CONSERVATION

TIME ALLOWED: TWO (2) HOURS

SPECIAL MATERIAL REQUIRED: NONE

INSTRUCTIONS: ANSWER QUESTION ONE AND ANY TWO OTHER QUESTIONS.

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SECTION A. COMPULSORY QUESTION

Question One

a. Using examples, explain the difference between agronomic and mechanical soil conservation practices? **15 marks**

b. It is alleged that the combination of agronomic and mechanical soil conservation practices are more effective in prevention of soil erosion and its rehabilitation. Describe a situation where the combination of the soil conservation practices would be useful (Use sketches to illustrate). **15 marks**

c. Given that air and water temperatures are 18.5oC and 13.2oC respectively, estimate the daily evaporation rate for a pond using Dalton's law, when the wind speed is 5 km/hr and relative humidity is 30%. **10 marks**

[40 marks]

SECTION B. ANSWER ANY TWO QUESTIONS

Question Two

a. Using the Zimbabwe method, determine the recommended spacing between terraces constructed on highly erodible soils (4.0) with an average slope of 1.9^0. Express your answer in metres when: 1ft = 0.3048m.

If the length of the field is 8000m, estimate the peak run off from the field when rain intensity is 110mm/hr and runoff coefficient of the field is 0.032. Design a waterway (using Manning's formula) to convey the peak runoff at the flow velocity is 1.5m/s and a coefficient 0.033. Provide a freeboard allowance of 20%

$$V = \frac{R^{2/3} \; S^{1/2}}{n}$$

[30 marks]

Question Three

a. Describe the influence of the following surface water runoff.

i. Soil bulk density

ii. Vegetation

iii. Soil additives

iv. Slope

Question Four **(30 marks)**

a. Given a rainfall intensity of 105mm/hr and a watershed with elevation of difference of 12m from the highest to the lowest point. Estimate the time of concentration if the length of the furthest point from the discharge area is 124m long.

12 marks

b. Describe the effect of the following in the rate of soil erosion;

i. Contour strips /10

ii. Length of Slope /8

(30 marks)