



**UNIVERSITY OF SWAZILAND
SUPPLEMENTARY EXAMINATION PAPER**

**PROGRAMME: DIPLOMA IN AGRICULTURE AND DIPLOMA IN
AGRICULTURE EDUCATION YEAR 3**

COURSE CODE: LUM 302 S (Old Programme)

TITLE OF PAPER: SOIL AND WATER CONSERVATION

TIME ALLOWED: TWO (2) HOURS

SPECIAL MATERIAL REQUIRED: NONE

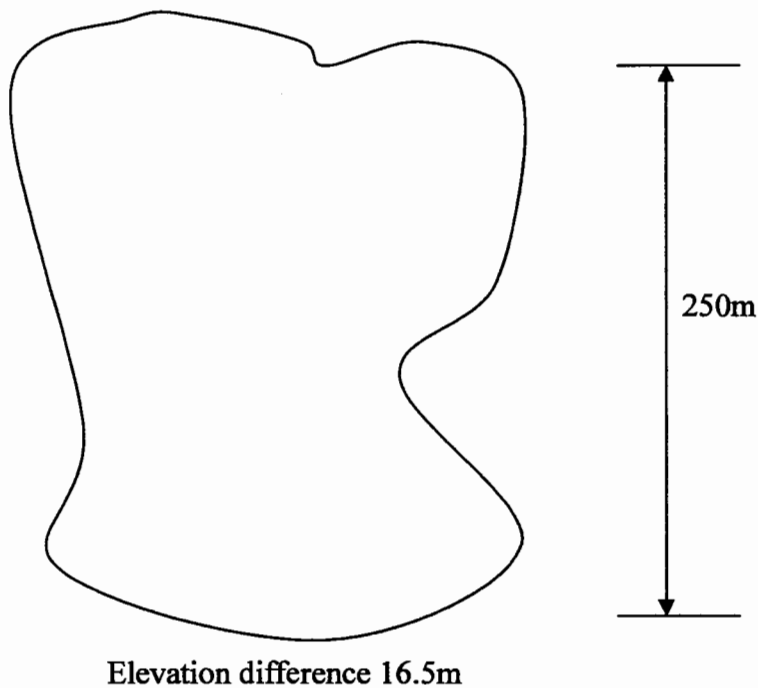
**INSTRUCTIONS: ANSWER QUESTION ONE AND ANY TWO
OTHER QUESTIONS.**

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GRANTED BY THE CHIEF INVIGILATOR**

SECTION A. COMPULSORY QUESTION**Question One**

- a. Given that 35ha of the catchment area below was sandy loam, relatively flat and good with a coefficient of 0.5, while 20 ha of the catchment area was clay loam, hilly and fair with a coefficient of 0.65. Taking the rainfall intensity to be 128 mm/hr, compute the peak run-off rate (m^3/s) using the rational formula and the time of concentration, using Kirpich's method (1940).

30 marks



- b. Describe the effect of the following on the rate of water erosion, using sketches where necessary.
- soil density
 - length of slope

10 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 with an average slope of 10%. Express your answer in metres.

15 marks

- c. Explain the importance of the following soil and water conservation measures highlighting the conditions where they are most applicable.
- i. tied ridges
 - ii. terraces

15 marks

Question Three

- a. The infiltration rate under shallow ponding was monitored as a function of cumulative rainfall and found to be 20mm/hr when a total of 100mm had infiltrated. If the eventual steady rate of infiltration was 5mm/h, estimate the infiltration rate at cumulative infiltration of 100mm and 300mm using the **Green-Ampt Equation**.

15 marks

- b. Describe the importance of mulching and minimum tillage in soil and water conservation.

15 marks

Question Four

- a. Crop management is also used as a soil conservation technique. Describe the methods used in this technique

20 marks

- b. Explain how surface culture influences the total amount of run-off water?

10 marks