



**UNIVERSITY OF SWAZILAND
SUPPLEMENTARY EXAMINATION PAPER**

PROGRAMME: BSC LWM 3 AND BSC AG ED 3

COURSE CODE: LUM 301

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. Soil conservation strategies on cultivated land include agronomic measures, soil management and mechanical methods. Give a detailed description of two methods of agronomic soil conservation.

20 marks

- b. Determine the peak run-off rate (using rational method) and run-off volume (using the US. SCS (1972) for a 25year return period storm from a 55 ha watershed with the following characteristics; rainfall intensity 105mm/hr with a duration of 6 hours, maximum length of flow is 435m and the difference in elevation along the flow path is 5m.

Area (ha)	Topography (%)	Soil group	Land Use	Hydrologic Conditions
35	2-5	C	Row crop contoured	Good
20	6-10	A	Pasture	Good

20 marks

SECTION B. ANSWER ANY TWO QUESTIONS**Question two**

- a. Describe four of the factors taken into consideration when designing a grassed waterway.

20 marks

- b. Describe the importance of terrace channels and waterways in soil and water conservation.

10 marks

Question three

- a. Describe how you would use mechanical conservation methods to prevent soil erosion.

10 marks

- b. Estimate the time of concentration for the watershed if the difference in elevation is 3.8 m and its length is 125 m.

10 marks

- c. Describe how the following conditions influence the amount of run-off water
- i. row crop
 - ii. forested areas

10 marks

Question four

- 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 8mm/h, estimate the infiltration rate at cumulative infiltration of 300mm and 400mm using the **Green-Ampt Equation**.

10 marks

- b. Given that air and water temperatures are 23.5°C and 11.2°C respectively, estimate the daily evaporation rate for a pond using Daltons law, when the wind speed is 5 km/hr and relative humidity is 35%.

10 marks

- c. Explain how surface culture influences water infiltration into the soil?

10 marks