# UNIVERSITY OF SWAZILAND

## DEPARTMENT OF GEOGRAPHY, ENVIRONMENTAL SCIENCE AND PLANNING

### FINAL EXAMINATION     DECEMBER 2006

### B.Sc. II

| | | |
|---|---|---|
| TITLE OF PAPER | : | WATER RESOURCES |
| COURSE CODE | : | GEP 228 |
| TIME ALLOWED | : | THREE (3) HOURS |
| INSTRUCTIONS | : | SECTION A IS COMPULSORY<br>ANSWER TWO QUESTIONS FROM SECTION B<br>ILLUSTRATE YOUR ANSWERS WITH<br>APPROPRIATE DIAGRAMS AND EXAMPLES |
| MARKS ALLOCATION | : | QUESTION ONE (1) CARRIES 40 MARKS. THE<br>OTHER QUESTIONS CARRY 30 MARKS EACH |

**THIS QUESTION PAPER IS NOT TO BE OPENED UNTIL PERMISSION HAS BEEN GRANTED BY THE INVIGILATOR**

## SECTION A:  COMPULSORY QUESTION

### QUESTION 1

(a)  Discuss the role of hydrology in socio- economic development.  (25 marks)

(b)  Explain the effect of climate on agricultural activities in Swaziland.  (15 marks)

**(40, marks)**

### SECTION B:  ANSWER ANY TWO QUESTIONS

### QUESTION 2

(a)  Explain the components of the hydrologic cycle.  (20 marks)

(b)  Explain why water is regarded as a renewable resource.  (10 marks)

**(30 marks)**

### QUESTION 3

Figure 1 shows the station rainfall values in a drainage basin. Estimate the basin average rainfall using the Thiessen Polygon method.  **(30 marks)**

### QUESTION 4

Describe and explain three methods used in assessing the available amount of water resources of a drainage basin.  **(30 marks)**

### Question 5:

Table 1 shows the total runoff hydrograph ordinates and the base flow ordinates from a rain storm that lasted for one day in the Mtilane river. The effective rainfall was estimated to be 2.7 mm. Derive the one day unit hydrograph.  **(30 marks)**
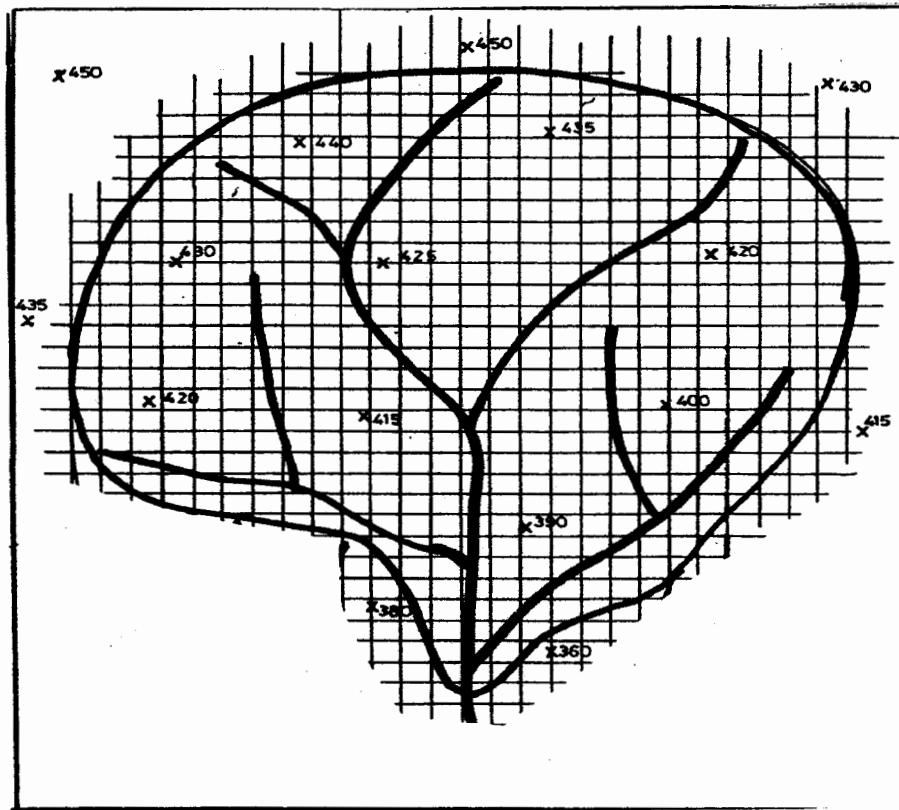
Figure 1. Rainfall stations and corresponding annual value (each small square is one square km)

**Table 1. Runoff hydrograph ordinates for the Mtilane river at Lozitha bridge.**

| Time (days) | Total RO Hyd. ordinates $(m^3/s)$ | Base flow ordinates $(m^3/s)$ |
|---|---|---|
| 1 | 0.47 | 0.47 |
| 2 | 1.06 | 0.34 |
| 3 | 1.99 | 0.27 |
| 3.5 | 3.08 | 0.23 |
| 4 | 1.99 | 0.28 |
| 5 | 1.48 | 0.40 |
| 6 | 1.03 | 0.50 |
| 7 | 0.84 | 0.62 |
| 7.5 | 0.68 | 0.68 |