

UNIVERSITY OF SWAZILAND
DEPARTMENT OF GEORAPHY, ENVIRONMENTAL SCIENCE AND PLANNING

MAIN EXAMINATION: DECEMBER, 2016

BSc and BSc Ed. II

TITLE OF PAPER : **WATER RESOURCES**

COURSE NUMBER : **GEP232**

TIME ALLOWED : **THREE (3) HOURS**

INSTRUCTIONS : **ANSWER TWO QUESTIONS FROM SECTION A**
AND TWO QUESTIONS FROM SECTION B
ILLUSTRATE YOUR ANSWERS WITH
APPROPRIATE DIAGRAMS

MARKS ALLOCATED : **QUESTIONS ONE CARRY 25 MARKS EACH**

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

SECTION A: ANSWER ANY TWO QUESTIONS

QUESTION 1

- a) Explain why unstable air mass can continue to rise up to near the tropopause. (13 marks)
 - b) Explain why maximum precipitation occurs below mountain summits in the tropics and subtropics while in temperate regions it occurs at mountain summits. (12 marks)
- (25 Marks)**

QUESTION 2

Describe two climate classification systems. (25 Marks)

QUESTION 3

Discuss the mechanisms behind the layering of the atmosphere. (25 Marks)

SECTION B: ANSWER ANY TWO QUESTIONS

QUESTION 4

- a) Explain the methods used to estimate the average precipitation of an area. (10 marks)
 - b) Which method in (a) above is likely to give accurate results and why? (5 marks)
 - c) Calculate the average precipitation of the given drainage basin in Figure 1 (each small square is 1 square km). (10 marks)
- (25 Marks)**
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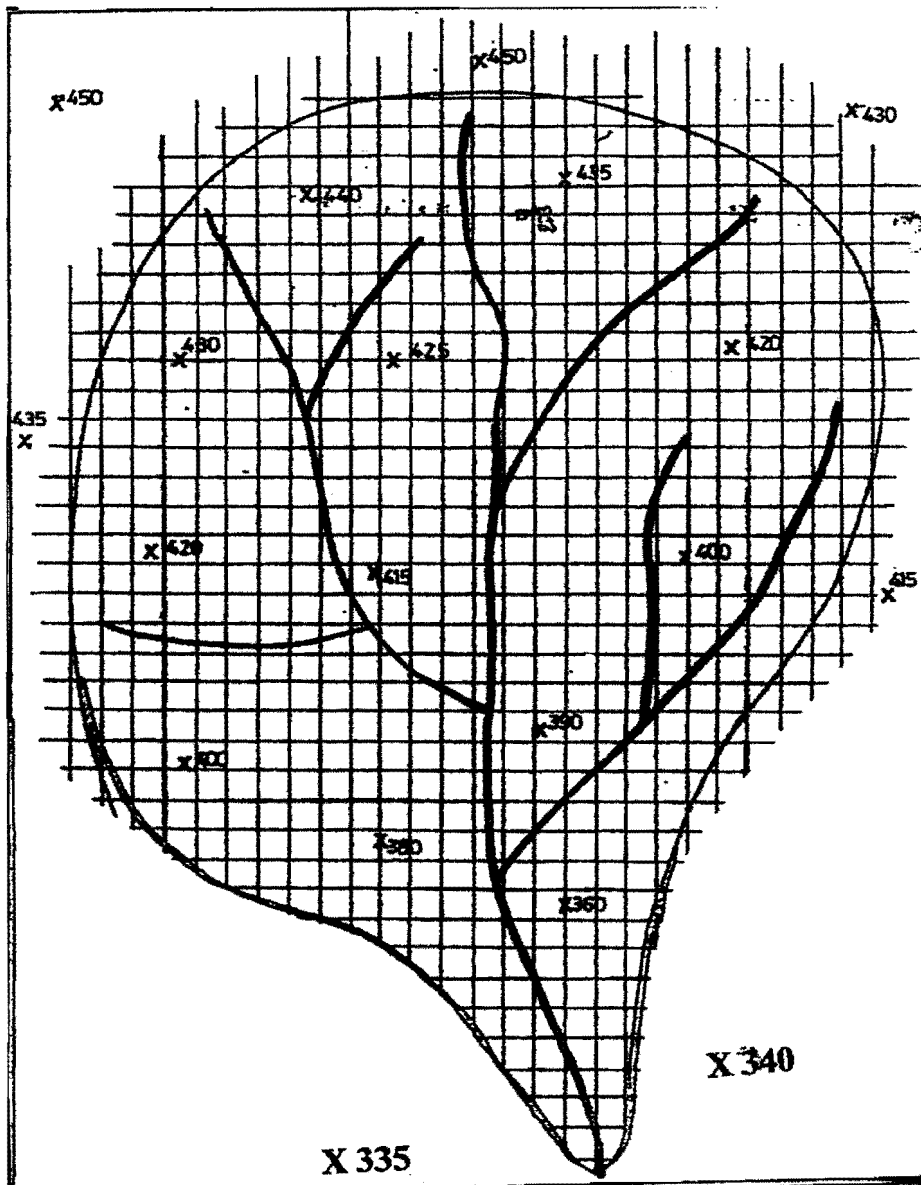


Figure 1 Annual precipitation (mm) at stations of a hypothetical river basin

QUESTION 5

Table 1 presents the current meter velocity measurements for Mtilane river at Lozitha Road Bridge. Calculate the total river discharge that was measured. (25 marks)

Table 1 Discharge measurement recordings at Mtilane River at Lozitha Road Bridge

Vertical number	Distance from river bank (m)	Water depth (m)	Velocity at 0.6 of the depth $V_{0.6}$ (m/s)
1	3.0	1.9	0.35
2	5.5	3.2	0.37
3	8.5	5.0	0.45
4	10.0	7.0	0.7
5	15.0	6.0	0.5
6	17.5	3.0	0.4
7	20.0	2.0	0.3
8	23.0	0.3	0.2
9	23.5	0.0	0.0

QUESTION 6

Figure 2 presents the mass curve for a hypothetical river basin. Estimate the preliminary reservoir capacity for a demand rate of 100,000 acre ft/year. (25 Marks)

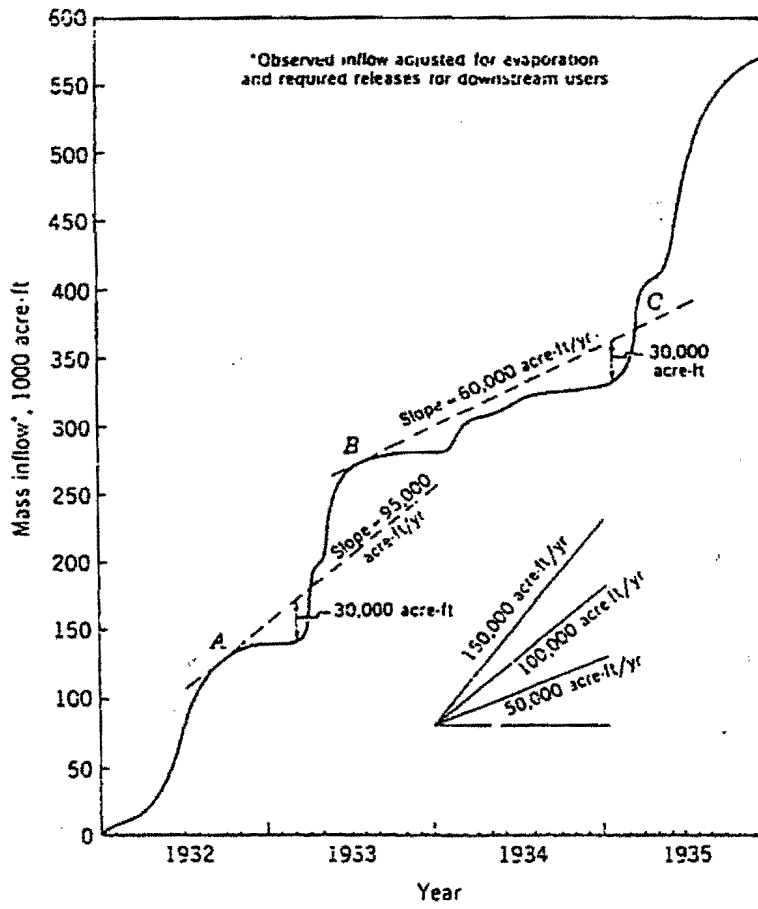


Figure 2 Mass curve for a hypothetical river basin