UNIVERSITY OF SWAZILAND

DEPARTMENT OF GEORAPHY, ENVIRONMENTAL SCIENCE AND PLANNING

MAIN EXAMINATION: DECEMBER, 2017

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 : ALL QUESTION ONE CARRIES EQUAL MARKS

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BY THE INVIGILATOR

GEP 232:   WATER RESOURCES   **(Main, December, 2017)**

SECTION A: ANSWER ANY TWO QUESTIONS

QUESTION 1

a) Explain why an unstable air mass can continue to rise up to near the tropopause.

(13 marks)

b) Describe the mechanisms behind the layering of the atmosphere.   (12 marks)

(25 Marks)

QUESTION 2

(a) Explain why the different climate classification systems are likely to produce similar climatic regions.   (13 marks)

(b) Explain the 'Coriolis Effect' on atmospheric circulation.   (12 marks)

(25 Marks)

QUESTION 3

Explain the air masses that control the weather of Southern Africa.   **(25 Marks)**

SECTION B: ANSWER ANY TWO QUESTIONS

QUESTION 4

a) Describe the factors that affect the runoff of a catchment.   (10 marks)

b) Table 1 presents the current meter velocity measurements for Mtilane River at Lozitha Road Bridge. Calculate the total river discharge that was measured.   (15 marks)

(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 5

a) Define the Unit Hydrograph. (5 marks)

b) State the assumptions behind the Unit Hydrograph theory. (10 marks)

c) The effective rainfall for the rainfall storm with the corresponding information given in Table 2 below is 0.3 mm per day. Determine the One Day Unit Hydrograph Ordinates.

(10 marks)

(25 Marks)

Table 2 Runoff hydrograph information for Mbuluzane River at GS10

Time (days)	Total RH ordinates (m3/s)	Baseflow ordinates (m3/s)		
1	0.01	0.01		
2	0.02	0.01		
3	0.07	0.01		
4	0.85	0.01		
5	0.74	0.04		
6	0.34	0.09		
7	0.19	0.14		
8	0.17	0.17		

QUESTION 6

Figure 1 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)**
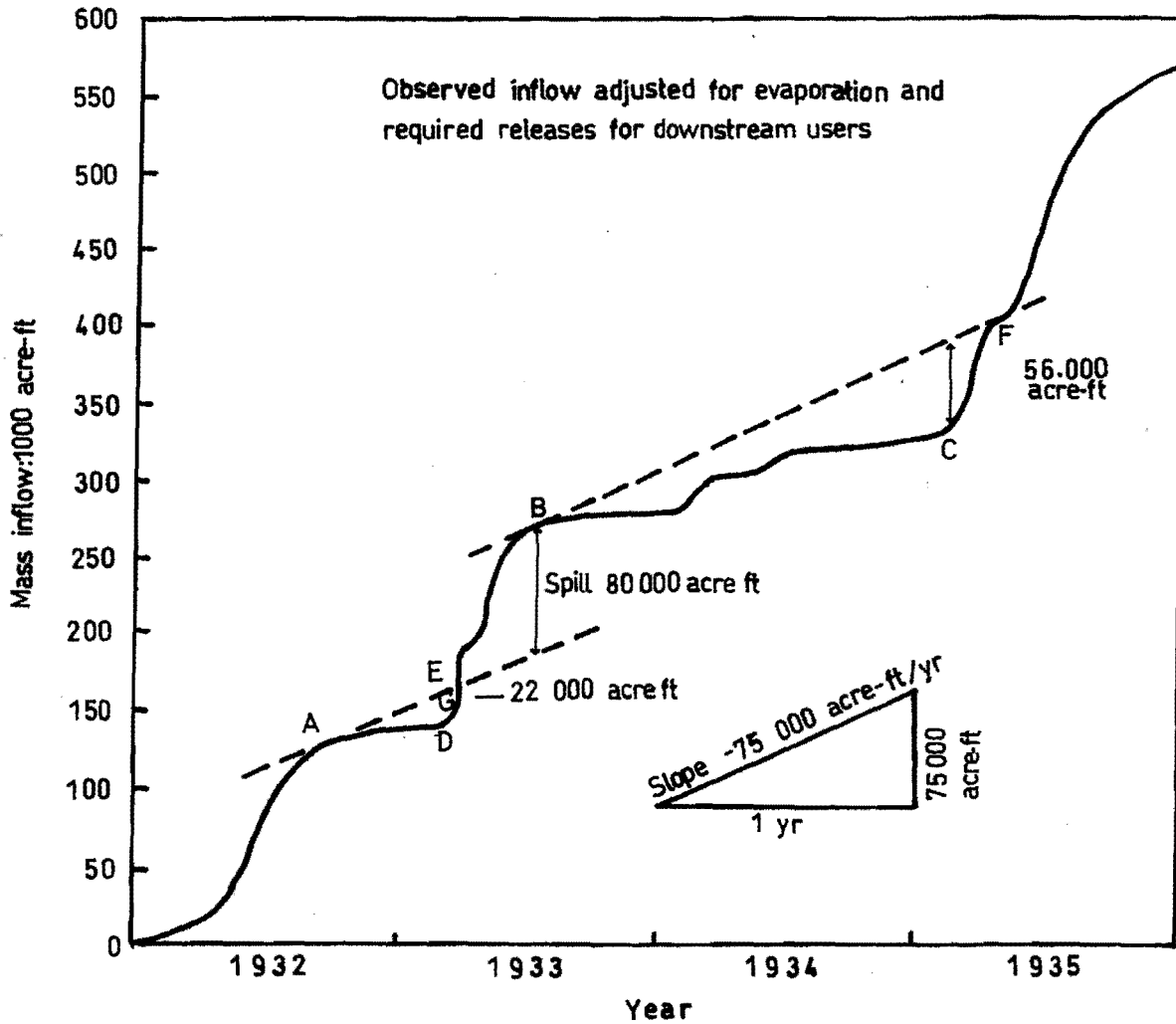
Figure 1 Mass curve for a hypothetical river basin