

UNIVERSITY OF SWAZILAND
DEPARTMENT OF GEORAPHY, ENVIRONMENTAL SCIENCE AND PLANNING

MAIN EXAMINATION: DECEMBER, 2014

B.Sc. II

TITLE OF PAPER : **WATER RESOURCES**

COURSE NUMBER : **GEP 228**

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

INSTRUCTIONS : **ANSWER TWO QUESTION FROM EACH SECTION**
ILLUSTRATE YOUR ANSWERS WITH
APPROPRIATE DIAGRAMS

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

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

GEP 228: WATER RESOURCES

SECTION A: ANSWER ANY TWO QUESTIONS

QUESTION 1

- (a) Explain the phenomena behind the layering of the atmosphere. (8 marks)
- (b) Discuss the factors affecting the amount of solar energy received by the earth. (10 marks)
- (c) 'The tropics do not get very hot and neither do the poles get very cold'. Discuss. (7 marks)
- (25 Marks)**

QUESTION 2

- (a) Explain why an air mass which is forced up a mountain range cools down. (5 marks)
- (b) An air mass at an elevation of 2250 meters has a temperature of about 10.5°C. What will be the temperature of this air mass at an elevation of 15750 meters if it is cooling at the dry adiabatic rate? (15 marks)
- (c) 'The inter-tropical convergence zone is not stationary'. Discuss (5 marks)
- (25 Marks)**

QUESTION 3

Figure 1 shows a map of a hypothetical drainage basin. Determine the average precipitation for the catchment if each small square is one km² (Use Thiessen polygon method). **(25 Marks)**

SECTION B: ANSWER ANY TWO QUESTIONS

QUESTION 4

- (a) Explain the factors that affect the rate of evaporation. (10 marks)
- (b) Use the mass transfer method to calculate the evaporation from open water given the following variables: $U_2 = 8.5$ km/hour; $e_a = 13.8$ mm of mercury; $e_d = 11.5$ mm of mercury. (15 marks)
- (25 Marks)**

GEP 228: WATER RESOURCES

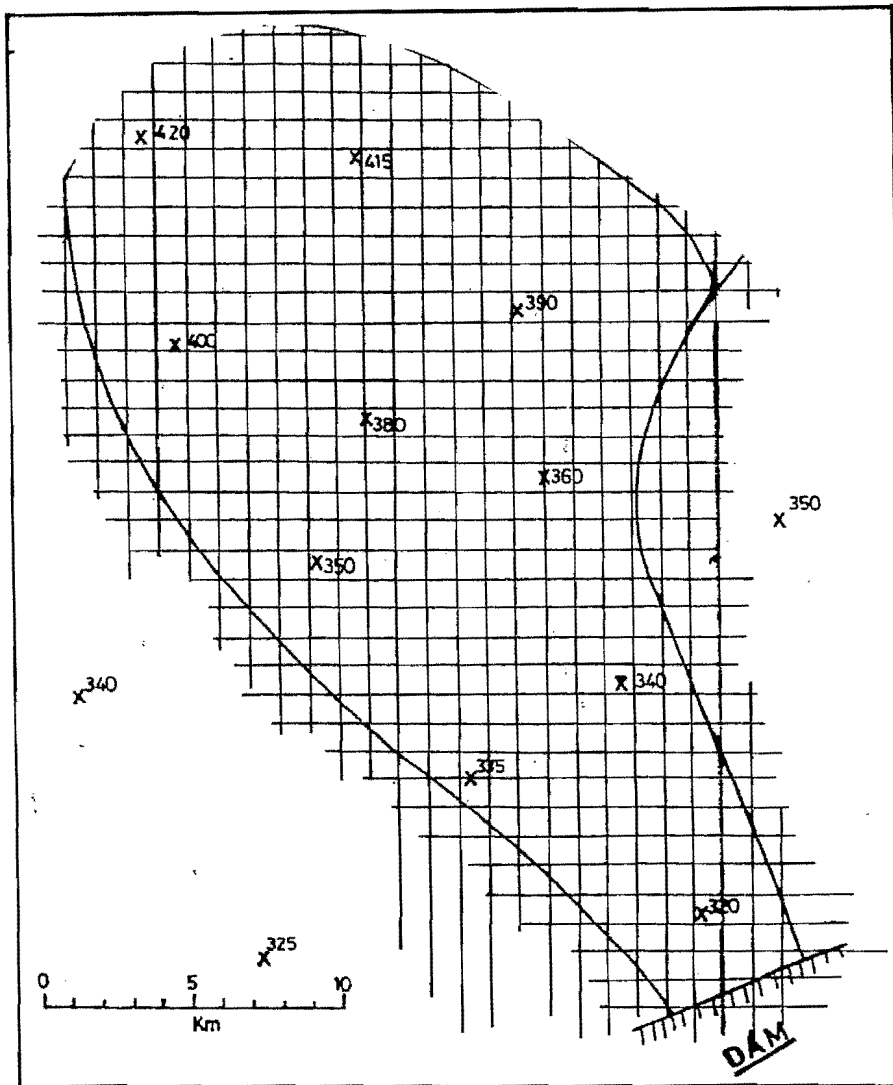


Figure1 : Map of a hypothetical drainage basin

QUESTION 5

- (a) Explain the factors influencing the runoff in a drainage basin. (15 marks)
 - (b) Describe two methods of discharge measurement. (15 marks)
- (25 Marks)**

GEP 228: WATER RESOURCES

QUESTION 6

Table 1 below shows the monthly discharges and their frequency of occurrences for a hypothetical river.

- (a) Draw the flow duration curve. (15 marks)
- (b) Explain how the flow duration curve in (a) can be used to estimate the preliminary storage capacity of a reservoir. (10 marks)
- (25 Marks)**

Table 1: Discharge categories and corresponding frequency of occurrences for a hypothetical river.

Discharge (m ³ /s)	Frequency
25 – 49	10
50 – 99	54
100 – 149	38
150 – 199	16
200 – 249	20
250 – 299	14
300 – 349	10
350 – 399	9
400 - 499	23
500 – 599	11
500 - 699	8
700 – 799	6
800 - 899	5
900 – 999	4
1000 - 1999	20
2000- 2999	4