

UNIVERSITY OF FORT HARE

Agrometeorology

AGC 111 & AGC 111F

DEGREE EXAMINATIONS

JUNE, 2023

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TIME : 3 HOURS
SUBJECT : AGC 111& AGC 111F
MARKS : 100

This paper consists of 4 pages including the cover page

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INSTRUCTIONS

Answer **ALL** questions

Question one (20 marks)

- a) List three ways in which relative humidity is of importance to agriculture. [3]
- b) Draw a graph that would give a general illustration of seasonal variation in the PET/ E_o ratio. [3]
- c) Local records constitute one of the sources of information on climate. What is meant by "local records". [2]
- d) With the aid of a well-labeled diagram, describe the hydrological cycle. No additional explanation is required. [6]
- e) Evaporation from the pan (E_o) can be used to estimate irrigation requirements of crops at various stages of growth. Calculate the amount of water that must be applied through irrigation if the following information is available to you?
PET/ E_o = 0.2; E_o = 50 mm. [2]
- f) List the four natural forms of water. [4]

Question two (20 marks)

- a) What determines the length of growing season for summer crops in South Africa? [2]
- b) Explain how the following factors influence the rate of evapotranspiration:
- i) The evaporative demand of the atmosphere [1]
- ii) The nature of the crop and stage of growth. [1]
- c) Given that the actual vapour pressure is 40 kPa and that saturation vapour pressure is 85 kPa, calculate the relative humidity. Show your working. [1]
- d) List any three agronomic practices that could be adjusted in order to counter the adverse effects of expected dry spells on crops. [3]
- e) i) Name the three types of psychrometers that are used to determine vapour content of the atmosphere. [3]
- ii) When using psychrometers, how do you determine relative humidity, saturation deficit or vapour pressure? [2]
- iii) What are some of the challenges that cause psychrometers to be inefficient in measuring humidity [3]

f) List any four characteristics of intensive agriculture [4]

Question three (20 marks)

a) Use the table below to determine the total heat units acquired by a maize plant over the five days that are shown in the table. {Hint: The Lower Threshold is 10 and upper threshold is 30}. [12]

Days	Min temp	Max temp	HEAT UNITS
Monday	7	28	
Tuesday	18	36	
Wednesday	14	32	
Thursday	15	30	
Friday	9	29	
TOTAL			

b) What name is given to areas that have a high hail risk? [2]

c) Name and define the three cardinal points of vital activity. [6]

Question four (20 marks)

a) Plants are grouped into three categories based on their hydrological preference of habitat. Name and give an example for each group. [6]

b) With the aid of a diagram show the formation of Convictional rainfall. [10]

c) What are the basic morphological characteristics associated with drought tolerance? [4]

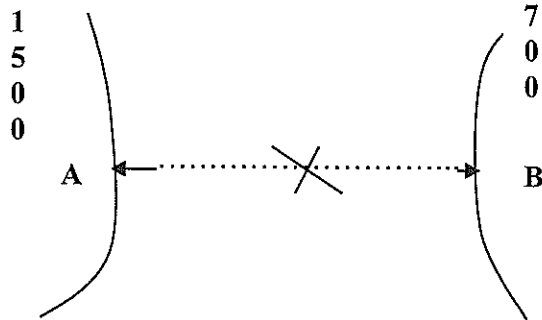
Question five (20 marks)

a) You are told that actual vapour pressure is 45 kpa, and saturation vapour pressure is 80 kpa.

i) Calculate the vapour pressure deficit for this place. [2]

ii) What is the relative humidity of this area? [2]

b) Calculate the rainfall that is expected at point "X" when you are provided with the following information. Shortest distance between isohyets = 80 mm. Distance between 700 mm isohyete and X = 50 mm. Show all your calculations. [5]



c) Define the following terms:

[4]

i) micro-climate;

ii) potential evapotranspiration (PET)

d) The following table gives the vapour pressure differences between two bodies of air and water. Calculate the vapour pressure gradients for the two different temperatures.

[4]

	10 °C	40 °C
<i>Saturation Vapour Pressure above free water (kPa)</i>	120.47	99.90
<i>Vapour pressure of air at RH = 50% (kPa)</i>	100.14	45.26
<i>Gradient in Vapour Pressure</i>		

e) A good description of climate cannot be made on the basis of averages only. Why is this the case?

[3]