



UNIVERSITY OF SWAZILAND
Faculty of Health Sciences
DEGREE IN ENVIRONMENTAL HEALTH
FINAL EXAMINATION PAPER 2007/2008

TITLE OF PAPER : **WATER RESOURCES MANAGEMENT II**

COURSE CODE : **EHS 581**

DURATION : **2 HOURS**

MARKS : **100**

INSTRUCTIONS :

- READ THE QUESTIONS & INSTRUCTIONS CAREFULLY**
- ANSWER ANY FOUR QUESTIONS**
- EACH QUESTION CARRIES 25 MARKS**
- WRITE NEATLY & CLEARLY**
- NO PAPER SHOULD BE BROUGHT INTO NOR OUT OF THE EXAMINATION ROOM**
- BEGIN EACH QUESTION ON A SEPARATE SHEET OF PAPER**

DO NOT OPEN THIS QUESTION PAPER UNTIL PERMISSION IS GRANTED BY THE INVIGILATOR.

QUESTION ONE

In a certain country, the President proudly presented the latest population statistics: the total population $P = 50$ million people, the fertility rate $f = 2$ average death rate of $d = 1$, and the population growth rate of 3%.

1. What is the average life expectancy? (6)
2. What percentage of people die each year? (6)
3. How many children are there per woman? (6)
4. How long will it take the population to double? (7)

QUESTION TWO

Consider a ten (10) day period of a maize crop, at a beginning of which the irrigation system breaks down so that no irrigation water is available over the entire period of 10 days. At day one the soil moisture is at field capacity. The following data are also given.

Potential evaporation E_{tm}	10 mm /d
Effective rainfall P_{eff}	0 mm /d
Rooting depth D	0.8m
Available soil moisture S_a	100 mm /m
Soil moisture depletion fraction p	0.55
Yield response facture	1.25

- a. Calculate, for the 10 days period, the day-to day available moisture, and actual evapotranspiration. (6)
 - b. Calculate the reduction due to the break down of the irrigation system. (6)
 - c. Calculate the actual evapotranspiration if there is 25mm of effective rainfall on each of the 6th and 7th day. (6)
 - d. Calculate the reduction in yield for (c) and (d). (7)
- 25 marks

QUESTION THREE

1. A family has not more than E100.00 per month to spend on water bills. At present at present the family pays E70.00.
 - a. Do you expect their reaction to a price increase of 10% to be elastic or rigid? Give reason(s) for your answer. (6)
 - b. A few years later after a number of price increases, the amount of money the family is paying amount to E100.00 per month. If the price is again increased by 10% how do you expect their reaction with regards to water demand to be? Explain your answer. (6)

2. Given the following parameters.

- (a) $E_{To} = 6.5$ mm/d
- (b) $F_c = 20$
- (c) $W_p = 10$
- (d) $D_{root} = 80$ mm
- (e) $K_c = 8.2$ mm/d
- (f) $P = 0.65$

Calculate the following

- a. Maximum evapotranspiration (E_{Tm}) of a crop. (4)
- b. Readily available moisture in the root zone (5)
- c. Readily available moisture to a plant roots (4)

QUESTION FOUR

- a) Fully describe four elements of water pricing that can be used in equity water allocation. (10)
- b) Write about water pricing as an important element and key instrument for the implementation of demand management in water resources management. (15)

QUESTION FIVE

- 1. Why it is important for the water resources manager to have knowledge about agriculture water demand? Explain five reasons for a requirement (10)
- 2. What do you understand by the following terms?
 - a. Evapotranspiration
 - b. Field capacity of the soil (f_c)
 - c. Wilting point of a crop (W_p)
 - d. The available soil moisture of a plant versus the readily available moisture of a plant
 - e. Effective rainfall (10)
- 3. You are asked to decide on a dispute of water allocation, in a nutshell what will you consider in solving the problem? (5)