UNIVERSITY OF SWAZILAND
Faculty of Health Sciences

DEGREE IN ENVIRONMENTAL HEALTH

FINAL EXAMINATION PAPER 2010

TITLE OF PAPER	:	**WATER RESOURCES MANAGEMENT 11**
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.

EHS 581 Water Resources Management Final Examination 2010

QUESTION ONE

1. Mention five demand-oriented measures in water resources management. (5)
2. Mention two advantages of an increasing block rate as opposed to flat rate in water tariffs (2)
3. Fully describe four elements of water pricing that can be used in equity water allocation. (8)
4. Write about water pricing as an important element and key instrument for the implementation of demand management in water resources management. (15)

QUESTION TWO

1. Why are population forecasts important for water resources management? (3)
2. In a certain country, the King announced 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 3%.
    1. What is the average life expectancy? (4)
    2. What percentage of people dies each year? (4)
    3. How many children are there per woman? (4)
    4. How long will it take the population to double? (5)

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. (5)
    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. (5)

Is evaporation a loss to the water resources of a country? Explain your answer. (2)

2. Given the following parameters.
    (a) ETo = 6.5 mm/d
    (b) Fc = 20
    (c) Wp = 10
    (d) D root = 80 mm
    (e) Kc = 8.2 mm/d
    (f) P = 0.65

Calculate the following

a. Maximum evapotranspiration (ETm) of a crop. (1)
b. Readily available moisture in the root zone (4)
c. Readily available moisture to a plant roots (3)

QUESTION FOUR

Consider a ten (10) days 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 Et_m	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

1. Calculate, for the 10 days period, the day-to day available moisture, and actual evapotranspiration. (5)
2. Calculate the reduction due to the break down of the irrigation system. (5)
3. Calculate the actual evapotranspiration if there is 25mm of effective rainfall on each of the 6 and 7 day. (10)

20 marks