

UNIVERSITY OF SWAZILAND
Faculty of Health Sciences
BSc DEGREE IN ENVIRONMENTAL HEALTH
MAIN EXAMINATION PAPER [Dec. 2017]

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

COURSE CODE : **EHM 419**

DURATION : **2 HOURS**

MARKS : **100 MARKS**

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

- a) Describe five factors affecting patterns of water use and demand for rural areas in Swaziland. (10 marks)
- b) You are employed by Swaziland Government to manage water resources at Lubovane dam in the lowveld. The water demand is perceived to be high and funds are not in abundance to develop new sources. Describe five water conservation measures that you will use to reduce the water demand and that will support efficiency and equitable provision of water supply for irrigation. (10 marks)
- c) Describe the advantage of a block tariff system in charging for water consumption in urban areas for domestic supply. (5 marks)

Question two

- a) What were the justifications advanced by the Dublin Conference (1992) in support of the four principles adopted (in the conference) as recommendation to reverse the trends of over consumption, pollution and rising threats of drought and floods in Africa? (8 marks)
- b) Describe the five advantages of using water pricing in the management of water resources in a river basing where water resources is inadequate and demand is high. (10 marks)
- c) How will you measure the consumer's economic value of water supply? (2 marks)
- d) Explain why when water price drastically changes there is little change in water demand and use unlike with other resources, where for a little change in price the consumer respond with considerable change in consumption. (5 marks)

Question three

- a) Explain five reasons why it is difficult to be close to accurate in forecasting water demand and use for a long term period. (10 marks)
- b) Describe five criteria used to assess a suitable method for water demand forecasting. (10 marks)

- c) What are the four weaknesses of using population growth rate to forecast future water demand? (5 marks)

Question four

- a) A farmer approaches you and tells you that he wants to plant maize on his one hectare land. He solicits information from you. What will your response be to the following enquires he makes:
- i. What is evapotranspiration of maize field? (3 marks)
 - ii. What are four determinants of evapotranspiration of maize field? (4 marks)
 - iii. What is maximum evapotranspiration of the maize? (3 marks)
 - iv. What should the farmer do to attain maximum evapotranspiration? (10 marks)
- b) Given that an alluvial, medium textured granite soil with coarse sand fraction, has the following parameters: moisture content (vol%) FC 80% and WP 10%. The maize crop is planned; with rooting depth of 0.80m; and the soil water depletion fraction $p = 0.60$. What is the readily available moisture for the maize on this soil? (5 marks)

Question five

Consider an eight (8) day period of a sugarcane crop, at the beginning of period no irrigation take place over the entire period of 8 days. At day one the soil moisture is at field capacity. The following data is also given.

Potential evaporation ET _m	8 mm /d
AM (Available moisture)	50 mm /d
RAM (Readily available moisture)	20mm/d

- a. Calculation for the 8 days period, the day-today available moisture, and actual evapotranspiration. (work shown on a table) (7Marks)
- b. Calculate the yield reduction (in %) due to the water depletion on the field. (5 marks)
- c. Calculate the actual evapotranspiration if there is 25mm of effective rainfall on the 5th day. (8 marks)
- d. Calculate the yield reduction (in %) due to the water depletion on the system. (5 marks)