

**UNIVERSITY OF SWAZILAND  
DEPARTMENT OF GEOGRAPHY, ENVIRONMENTAL SCIENCE AND  
PLANNING**

**MAIN EXAMINATION:                   DECEMBER, 2009  
B.Sc. IV**

**TITLE OF PAPER                   :     WATER RESOURCES PLANNING**

**COURSE NUMBER                 :     GEP 421**

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

**INSTRUCTIONS                 :     SECTION A IS COMPULSORY  
ANSWER ANY TWO QUESTIONS FROM  
SECTION B  
ILLUSTRATE YOUR ANSWERS WITH  
APPROPRIATE DIAGRAMS**

**MARKS ALLOCATED             :     QUESTION 1 CARRIES 40 MARKS THE  
OTHER QUESTIONS CARRY 30 MARKS  
EACH**

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

**SECTION A: COMPULSORY QUESTION**

**Question 1**

- (a) Explain how water demand for an urban area is estimated. (20 marks)
  - (b) A rural community in the Lowveld has a population of 6,000 people. The estimated rural water consumption per day per capita is 35 litres. Design a water supply scheme that would meet the demand till year 2019. (Hint: the population growth rate for Swaziland is about 2.9%) (20, marks)
- (40 marks)**

**SECTION B: ANSWER ANY TWO QUESTIONS**

**Question 2**

- (a) Explain any two methods of engineering economy analysis. (15 marks)
  - (b) Discuss the importance of carrying out an economic analysis in water resources planning. (15 marks)
- (30 marks)**

**Question 3**

Discuss the principle doctrines in water law. (30 marks)

**Question 4**

Distinguish between aerobic and anaerobic lagoons. (30 marks)

**Question 5**

Discuss the major functions of hydraulic structures in an irrigation scheme. (30 marks)