



MASENO UNIVERSITY
UNIVERSITY EXAMINATIONS 2015/2016

**FOURTH YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE
OF BACHELOR OF SCIENCE IN EARTH SCIENCE WITH
INFORMATION TECHNOLOGY**

MAIN CAMPUS

NGA 406: GROUNDWATER MANAGEMENT

Date: 6th January, 2016

Time: 11.00 - 1.00pm

INSTRUCTIONS:

- Answer Question ONE and any other TWO questions.
- Sketch maps and diagrams should be used whenever appropriate



NGA 406: GROUNDWATER MANAGEMENT

1. a) Examine the implications of aspect on groundwater 'drought'. (6 marks)
b) Below is information showing groundwater level in a well in Kisumu. The average recharge estimate is $25 \text{ Mm}^3/\text{a}$ and the annual abstraction in 2002 was $31 \text{ Mm}^3/\text{a}$. Use this information to answer the following questions.

Year	Water level (m bgl)
1958	86
1965	86
1969	88
1971	89
1975	100
1977	107
1982	118
1985	120
1989	116
1994	131
1996	133

- i) Draw a hydrograph for the well and explain your results. (8 marks)
ii) Make recommendations for the management of the aquifer assuming the data is representative. (6 marks)
c) Discuss the limitation of the use of sustainable yield concept in the management of groundwater resources. (10 marks)
2. Discuss the main challenges associated with management of transboundary aquifers in Africa. (20 marks)
3. a) Assess groundwater management strategies to mitigate climate change impacts. (10 marks)
b) Discuss the rationale for integrated groundwater management in Kenya. (10 marks)
4. a) Discuss basic components to be considered in aquifer management. (10 marks)
b) Explain the main reasons for groundwater assessment. (10 marks)

5. Assess fundamental parameters commonly used to define characteristics of an aquifer. (20 marks)
6. Discuss the main source of groundwater pollution and their mitigation practices. (20 marks)