



MASENO UNIVERSITY
UNIVERSITY EXAMINATIONS 2015/2016

THIRD YEAR SECOND SEMESTER EXAMINATIONS FOR THE
DEGREE OF BACHELOR OF SCIENCE IN ENVIRONMENTAL
SCIENCE WITH INFORMATION TECHNOLOGY

MAIN CAMPUS

**NES 309: HYDROLOGY AND WATER RESOURCES
MANAGEMENT**

Date: 21st April, 2016

Time: 11.00 - 1.00 pm

INSTRUCTIONS:

- Answer question ONE and any other TWO questions.



1. (a) Explain any three characteristics of water that makes it a unique liquid. [6 marks]
- (b) Using a well labeled diagram, describe the key hydrological processes. [8 marks]
- (c) Differentiate between Bergeron theory and collision-coalescence theory. [6marks]
- (d) There exist four (4) rain gauge stations in a catchment. The average annual rainfall at these stations are: 450mm, 540mm, 620mm, and 800mm respectively. Determine the optimum number of rain gauges required in this catchment if one desires to limit the error in the mean value of rainfall in the catchment to 10%. [10 marks]

2. (a) Isohyets for annual rainfall of a catchment were drawn and the areas of strips between the isohyets were determined as indicated in the Table below:

Isohyets (cm)	Area (km ²)
80	560
90	2,900
100	2,800
110	1,020
125	600
145	240

Calculate the average annual rainfall of the catchment [12 marks]

- (b) By use of an illustration, describe Darcy's law of movement of water in soil layers. [8 marks]
3. Describe the factors that affect quantity of runoff occurring during and after precipitation. [20 marks]
4. Discuss the options of extending water supply that can be adopted by Mombasa County to alleviate water crisis. [20 marks]
5. Using well a labeled illustration, describe the hydrogeological conditions for the occurrence of a flowing artesian well in a catchment. [20 marks]
6. Discuss how Universal Soil Loss Equation (USLE) can be used to estimate water erosion of a catchment. [20 marks]