MASENO UNIVERSITY

UNIVERSITY EXAMINATIONS 2013/2014

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

(MAIN CAMPUS)

NGA 215: FUNDAMENTALS OF HYDROLOGY

Date: 8th April, 2014 Time 11.15 a.m. – 1.30 p.m.

INSTRUCTIONS:

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

NGA 215: FUNDAMENTALS OF HYDROLOGY

1. a) Discuss the a catchment concept. (5 marks)

   b) Given that $3.75m^3$ /s of water flows from a 200 km^2 catchment. Determine the amount that flows out of this catchment in millimeters per day (mm/d). (4marks)

   c) Explain the following terms

   i. Detention storage 2 marks
   ii. Depression storage 2 marks
   iii. Perched water table 2 marks
   iv. Water resources 3 marks

   d) Discuss any three types of springs. (12 marks)

2. a) Explain the basic functioning of the hydrologic cycle. (10 marks)

   b) Examine five human activities that influence the hydrologic cycle. (10 marks)

3. a) Examine the types of evaporation (10 marks).

   b) Discuss factors that affect evapotranspiration. (10 marks)

4. a) Describe the following methods of calculating mean rainfall
   i. Isohyetal method (5marks)
   ii. Thiessen polygon method (5marks)

   b) Precipitation falling on a catchment is measured by six rain gaugesas shown in the table. Calculate the areal rainfall of the area using.

   i. Arithmetic method (2 marks)
   ii. Thiessen polygons method (8 marks)

Station	Rainfall (cm)	Area (km^2)	Station	Rainfall (cm)	Area (km^2)
1	8.8	570	7	10.5	650
2	7.6	920	8	11.2	500
3	10.8	720	9	9.5	350

4	9.2	620	10	7.8	520
5	13.8	520	11	5.2	250
6	8.5	400	12	5.6	350

5. a) Explain the concept of water budget of a catchment. (8 marks)

b) The following table gives rainfall and evaporation values of major world rivers. Determine runoff values in mm and runoff coefficients for each river. (12 marks)

River	Precipitation (mm)	Evapotranspiration (mm)
Nile	220	190
Orinoco	1330	420
Parana	1000	625
Mekong	1500	1000
Lena	350	140
Rhine	850	500
Amur	450	265
Yenisei	450	220
Ob	450	325
Mississippi	800	654

6. a) Examine types of geological formations. (8 marks)

b) Describe types of aquifers (12 marks)