# EMBU UNIVERSITY COLLEGE
## (A CONSTITUENT COLLEGE OF THE UNIVERSITY OF NAIROBI)

### FIRST SEMESTER EXAMINATION 2013/2014

### FIRST YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN WATER RESOURCES MANAGEMENT

### AWM 102: CLIMATOLOGY

DATE: DECEMBER 4, 2013                    TIME: 2.00 – 4.00PM

**INSTRUCTIONS:**

**Answer Question One and Any Other Two Questions**

## QUESTION ONE

a) Describe the challenges encountered in the study of paleoclimatology.          (3 Marks)

b) Identify four disadvantages resulting from inadvertent weather modification.(4 Marks)

c) Distinguish between ionosphere and exosphere.          (4 Marks)

d) Explain the concept of SOND and MAM as used for climate in East Africa.     (3 Marks)

e) Describe the main features of the Dry Mid-Latitude Climates, under Group II Climatic Classification.          (6 Marks)

f) Describe briefly the El Nino-Southern Oscillation (ENSO)          (6 Marks)

g) As a Water Resources Manager, state the actions you can propose to combat the spread of desertification in your area of jurisdiction.          (4 Marks)

## QUESTION TWO

a) The atmosphere is divided into layers according to major changes in temperature. Explain this concept with illustrations          (10 Marks)

b) Explain why the magnetosphere is important to the biosphere.          (5 Marks)

c) State five characteristic features of cold deserts.          (5 Marks)

## QUESTION THREE

a) Explain the basis for the Koppen Climate Classification System? (2 Marks)

b) Desscribe the five major climate types identified by WladmirKoppen. (10 Marks)

c) Sate what the major features of the Tropical Moist Climates (Af). (3 Marks)

d) State five causes of climate change? (5 Marks)


## QUESTION FOUR

a) Explain what a weather station is? (2 Marks)

b) Explain the differences between manual and automated observation of weather.

(4 Marks)

c) Describe the main sensors found in a typical weather station. (5 Marks)

d) Describe the use of the following weather instruments and structures: (4 Marks)

   i.   Disdrometer

   ii.  Transmissometer

   iii. Ceilometer

   iv.  Stevenson Screen

e) State five ways in which drought events can be predicted. (5 Marks)


## QUESTION FIVE

a) Differentiate between *albedo* and *insolation* as used in solar radiation. (2 Marks)

b) Describe any three factors that affect evaporation. (3 Marks)

c) Thiessen polygons constructed for a network of 10 rain-gauges in a river basin 5800 km$^2$ yielded Thiessen weights of 0.10, 0.16, 0.12, 0.11, 0.09, 0.08, 0.07, 0.11, 0.06 and 0.10. The rainfalls recorded at these gauges during a cyclonic storm are 132, 114, 162, 138, 207, 158, 156, 135, 168 and 150 mm, respectively. Determine,

   i.   The average depth of rainfall by the Thiessen and Arithmetic Mean Methods.

(5 Marks)

   ii.  The volume of surface runoff (in million cubic meters) at the basin outlet if 35% of the rainfall is lost as infiltration. (5 Marks)

d) Identify five types of stations used to collect weather data. (5 Marks)

**--END--**