THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)
Faculty of Engineering and Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

Institutional Based Program

**UNIVERSITY EXAMINATION FOR BACHELOR OF ENGINEERING IN
BUILDING & CIVIL ENGINEERING** (YR 3, SEM 2)

EBC 4321: HYDROLOGY

END OF SEMESTER EXAMINATION

SERIES: APRIL 2012
TIME: 2 HOURS

<u>**Instructions to Candidates:**</u>
You should have the following for this examination
- *Answer Booklet*

This paper consists of **FIVE** questions in **TWO** sections **I & II**
Answer question **ONE (Compulsory)** and any other **TWO** questions
Maximum marks for each part of a question are clearly shown
This paper consists of **THREE** printed pages

SECTION I (Compulsory)

Question 1

a) Define hydrology   (2 marks)

b) With an aid of a diagram, describe the hydrological cycle   (10 marks)

c) Discuss any **FOUR** methods used in estimation of the average rainfall over an area (areal rainfall)

   from point measurements   (10 marks)

d) What are the sources of errors in rain gauge measurements   (8 marks)

SECTION II (Answer any TWO questions)

Question 2

a) Differentiate between non-recording gauge and recording gauge   (2 marks)

b) Discuss any **THREE** methods of dealing with missing rainfall measurements   (9 marks)

c) What are the possible errors in discharge measurements   (9 marks)

Question 3

a) What are the possible causes of missing data   (4 marks)

b) The annual precipitation data for two sites are as shown below in a table. The record for the year 1971 is missing. Complete the table using simple linear regression method

Year	t	X_t	Y_t
1961	1	10.2	6.1
1962	2	8.5	9.5
1963	3	2.8	1.8
1964	4	5.4	6.0
1965	5	15.2	9.5
1966	6	10.1	5.3
1967	7	9.2	2.3
1968	8	14.8	11.6
1969	9	11.1	7.7
1970	10	6.6	3.0
1971	11	3.3	?
Means			
Biased Standard Deviation S			
Unbiased Standard Deviation S*			

c) Climatic and physiographic factors mainly influence the run-off of an area. Which are these climatic factors   (6 marks)

Question 4

a) With an aid of a sketch, explain how one can estimate rainfall by employing isoyetal analysis method.   (8 marks)

b) Using the figure below, estimate the mean aerial precipitation for the river basin   (12 marks)

FIGURE 1

Other details include the following:

Station	Distance (Km)
A	1.1
B	0.5
C	0.6
D	1.4
E	1.4

Question 5

a) Given the following data, A, B, C and Y where normal annual precipitation NP(A), NP(B), NP(C) and NP(Y) are available. Assuming that on a given rainy day t, the precipitation at gage Y is missing. Estimate $P_t(Y)$ based on the gage readings at the other stations by using inverse distance method. The data available were:

$P_t(A)$ =   98mm, NP(A) = 1,008mm
$Pt (B)$ =   80 mm, NP (B) = 842 mm
$Pt (Y)$ =   ?mm,   NP(Y) = 880mm   (2 marks)

b) Mention parameters that define rainfall   (5 marks)

c) Make short notes on the following:
   (i)   Convection rainfall
   (ii)   Orographic lifting
   (iii)   Frontal lifting
   (iv)   Tropical depression or hurricanes   (8 marks)

d) Discuss procedure of determining discharge in a river   (5 marks)