



# 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

## Instructions to Candidates:

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

- Define hydrology (2 marks)
- With an aid of a diagram, describe the hydrological cycle (10 marks)
- Discuss any **FOUR** methods used in estimation of the average rainfall over an area (areal rainfall) from point measurements (10 marks)
- 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 <sub>t</sub>	Y <sub>t</sub>
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:

<b>Station</b>	<b>Distance (Km)</b>
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:

$$P_t(A) = 98\text{mm}, NP(A) = 1,008\text{mm}$$

$$P_t(B) = 80\text{ mm}, NP(B) = 842\text{ mm}$$

$$P_t(Y) = ?\text{mm}, NP(Y) = 880\text{mm}$$

(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)

