



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of Jkuat)

Faculty of Engineering and Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

DIPLOMA IN CIVIL ENGINEERING

EBC 2320: HYDROLOGY

END OF SEMESTER EXAMINATION

SERIES: AUGUST/SEPTEMBER 2011

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer booklet*

This paper consists of **FIVE** questions

Answer question **ONE (COMPULSORY)** and any other **TWO** questions

This paper consists of **THREE** printed pages

SECTION A (COMPULSORY) - 30 MARKS

Question 1

a) Define the following terms

- (i) Hydrology
- (ii) Hail
- (iii) Drizzle
- (iv) Evapotranspiration
- (v) Rainfall intensity
- (vi) Isohyet
- (vii) Hydrograph (16 marks)

b) With the aid of a sketch, briefly describe the hydrologic cycle (8 marks)

c) Make a labeled sketch of a standard rain gauge showing all salient dimensions (6 marks)

SECTION B (Answer any TWO questions from this section) – 40 MARKS

Question 2

a) State **FOUR** factors considered when selecting a site for a rain gauge station (4 marks)

b) State **FOUR** advantages of recording rain gauges (4 marks)

c) Outline the procedure of calculating the depth of rainfall using a standard rain gauge (4 marks)

d) A drainage basin has **FIVE** existing rain gauge station. The average annual precipitation at these stations were recorded as shown in table 1

Station	A	B	C	D	E
Average annual precipitation	90	80	54	45	41

Table 1

Determine the optimum number of rain gauges in the basin so as to limit the percentage error to within 10%. (8 marks)

Question 3

a) The values of annual precipitation at a rain gauge station, expressed in cm per year in chronological order from 1956 to 1967 are indicated in table 2.0

Year	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
Precipitation (cm)	36.5	29.0	56.2	82.0	27.8	23.4	71.2	48.3	31.4	18.1	29.0	65.6

Table 2

Using Weibull formula $T = (N+1)/M$ estimate:

The maximum value of precipitation which has a recurrence value of 5 years.

- b) The following data were obtained from rainfall data in a catchment using Thiessen polygon method

Station	A	B	C	D	E
Polygon Area (ha)	518	777	906	1495	748
Observed rainfall (mm)	267	198	142	114	81

Table 3

- (i) Estimate the average depth of rainfall in the catchment
- (ii) Estimate the total “volume” of rainfall water received in m^3 in the catchment.

Question 4

- a) Sketch and label a USWB class A pan (6 marks)
- b) Outline **FOUR** factors that affect the evaporation rate (8 marks)
- c) During a daily routine observation 10.8 litres of water were added to bring the water level in an evaporation pan to the stipulated (normal) level. A nearby rain gauge measured 3.6mm of rainfall. Determine the evaporation for that day if the diameter of the pan is 1206.5mm. (6 marks)

Question 5

- a) Define the following terms
- (i) Infiltration
- (ii) Percolation
- (iii) Infiltration capacity
- (iv) Runoff
- (v) Unit hydrograph (10 marks)
- b) Explain **FIVE** factors that influence the quantity of runoff in catchment (10 marks)