



TECHNICAL UNIVERSITY OF MOMBASA
**Faculty of Engineering &
Technology**

DEPARTMENT OF BUILDING & CIVIL ENGINEERING
HIGHER DIPLOMA IN BUILDING & CIVIL ENGINEERING (HDBCE 12S)

EBC 3202: HYDROLOGY I

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: JUNE 2013

TIME ALLOWED: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*

This paper consists of **FIVE** questions.

Answer any **THREE** questions

Maximum marks for each part of a question are as shown

This paper consists of **THREE** printed pages

Question One

a) Define the following forms of precipitation;

- (i) Drizzle
- (ii) Rain
- (iii) Snow
- (iv) Hail
- (v) Glaze

(10 marks)

b) Outline any **THREE** examples of use of data derived from the study of hydrology. (6 marks)

c) Define the following terms:

- (i) Hydrology
- (ii) Evapotranspiration

(4 marks)

Question Two

a) With the aid of a sketch, explain the working principle of ‘tipping bucket raingauge’

(6 marks)

b) The data in table 1 were obtained for a certain catchment. The Thiessen polygon areas were determine for each station. Estimate the average precipitation using:

- (i) Thiessen polygon method
- (ii) Arithmetic mean method

(14 marks)

Table 1

Station	I	II	III	IV	V	VI	VII	VII
Thiessen Polygon Area (m ²)	170	164	156	116	36	124	42	
Precipitation (mm)	93	105	109	122	135	140	142	128

Question Three

a) Make a labeled sketch of a USWB class A pan

(6 marks)

b) The data shown in table 2 were obtained from an evaporation pan in Nyeri. The standard cup used holds 0.5mm equivalent of rainfall.

- (i) Determine the evaporation rate for Nyeri for the period.

Table 2

Day	1	2	3	4	5	6	7
Rainfall mm	14	6	12	8	0	5	6
No. of cups removed	10	-	-	-	-	-	-
No. of cups added	-	-	-	-	14	8	6

(ii) Determine the evaporation loss in m^3 during the same period from a nearby lake with an area of 640ha assuming a pan coefficient of 0.75 **(8 marks)**

c) In a certain catchment area, the daily precipitation was observed in eleven raingauge stations as shown in table 3. On a certain day, the observations indicated that one raingauge station was out of order. The normal annual precipitation of the other stations is within 105 of the average rainfall of the station out of order. Estimate the missing data at station H. **(6 marks)**

Table 3

Station	A	B	C	D	E	F	G	H	I	J	K
Precipitation (mm)	21	33	19	20	23	24	19		21	22	18

Question Four

a) A basin has an area of $26560km^2$, a perimeter of 965km and an axial length of 230km. Determine:
 (i) Form factor
 (ii) Compactness coefficient
 (iii) Elongation ratio
 (iv) Circularity ratio **(10 marks)**

b) The data shown in table 4 was obtained during a stream flow exercise. Using the mean section method, determine the stream discharge. **(10 marks)**

Table 4

Distance from left bank (m)	0	2.2	4.2	6.0	7.8	8.8
Depth of vertical (m)	0	0.6	0.80	1.20	0.60	0
Mean velocity in vertical (m/s)	0	0.68	0.83	1.31	0.72	0

Question Five

a) With the aid of sketch, illustrate the following:
 (i) Unconfined aquifer
 (ii) Confined aquifer
 (iii) Artesian well
 (iv) Perched water aquifer
 (v) Ground water table **(10 marks)**

b) In relation to ground water, define the following terms:
 (i) Aquifer
 (ii) Aquiclude
 (iii) Specific capacity of a well
 (iv) Specific yield
 (v) Transmissibility **(10 marks)**