TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

DIPLOMA IN BUILDING & CIVIL ENGINEERING (DBCE 11)
DIPLOMA IN CIVIL ENGINEERING (DC 11)

EBC 2310: HYDROLOGY

SPECIAL/SUPPLEMENTARY EXAMINATION
SERIES: OCTOBER 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 terms:
- **(i)** Rain
- **(ii)** Smog
- **(iii)** Dew
- **(iv)** Sleet **(10 marks)**

b) Outline THREE factors that affect precipitation at a specific location **(6 marks)**

c) Briefly explain the term "artificial precipitation" **(4 marks)**

Question Two

a) With the aid of a sketch, explain the working principle of a tipping bucket raingauge **(6 marks)**

b) During an exercise to determine the average precipitation of a certain catchment, Thiessen polygons were constructed for a network of eight raingauge stations and the resulting data is shown in table 1. Determine the average precipitation using:
- **(i)** Arithmetic mean method
- **(ii)** Thiessen polygon metho**d**

(14 marks)

Table 1

Station	P	Q	R	S	T	U	V	W
Precipitation	4	4.8	3.8	5.5	4.9	3.7	2.5	4.0
Area of polygon (ha)	15	415	475	66	358	498	104	72

Question Three

a) Outline FOUR factors that affect the rate of evaporation **(8 marks)**

b) Sketch and label a USWB class A evaporation pan **(6 marks)**

c) The data shown in table 2 were obtained from an evaporation pan at a certain station. The standard cup used holds 0.5mm equivalent of rainfall. Determine the evaporation rate for that station during that period **(6 marks)**

Day	1	2	3	4	5	6	7
Rainfall in mm	28	12	24	16	0	10	12
No. of cups removed	20	-	-	-	-	-	-
No. of cups added	-	12	-	-	28	16	12

Question Four

a) A basin has the following details
- Axial length (i.e. length of main stream) 6km
- Length of ridgeline 13.5km
- Area of catchment 7.0km2
- Tetaino of streams 40

Determine the following characteristics of the catchment.

(i) Drainage density
(ii) Form factor
(iii) Shape factor
(iv) Stream density
(v) Circularity ratio
(vi) Elongation ratio
(vii) Shape factor
(viii) Compactness coefficient **(16 marks)**

b) Define the following types of streams:
(i) Influent
(ii) Ephemeral **(4 marks)**

Question Five

a) The data shown in table 3 was obtained during a stream flow exercise. Determine the discharge using the "mean section" method. **(12 marks)**

Table 3

Distance from left bank (m)	0	2.0	3.8	5.6	7.6	9.8
Depth of vertical (m)	0	0.60	1.21	0.80	0.60	0
Mean velocity in vertical (ms)	0	0.72	1.31	0.83	0.68	0

b) With the aid of a sketch, illustrate the following:
(i) Perched water aquifer
(ii) Unconfined aquifer
(iii) Confined aquifer
(iv) Artesian well **(8 marks)**