THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

((A Constituent College of JKUAT)

(A Centre of Excellence)

Faculty of Engineering & Technology in Conjunction with Kenya Institute of Highways and Building & Technology (KIHBT)

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

HIGHER DIPLOMA BUILDING & CIVIL ECONOMICS

EBE 3118: HYDRAULICS II

END OF SEMESTER EXAMINATION
SERIES: DECEMBER 2012
TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*
- *Scientific Calculator/Mathematical Table*

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 (20 Marks)

a) With the aid of a sketch briefly describe "the hydrologic cycle" **(10 marks)**

b) Define the following forms of precipitation
- **(i)** Rainfall
- **(ii)** Snow
- **(iii)** Hail
- **(iv)** Smog
- **(v)** Drizzle **(10 marks)**

Question Two (20 marks)

a) Make a labeled diagram of a standard raingauge. **(6 marks)**

b) While determining the average precipitation for a certain catchment, thiessen polygons were constructed for a network of eight gauges and the resulting data are shown in table 1.

Determine the average precipitation using:
(i) Arithmetic mean method
(ii) Thiessen polygon method **(14 marks)**

Station	Precipitation (mm)	Area in km^2 of Thiessen Polygon
A	40	4.2
B	25	10.4
C	37	49.8
D	49	35.8
E	55	6.6
F	38	47.2
G	48	41.5
H	40	1.5

Table 1

Question Three (20 marks)

a) Briefly describe the following types of streams:
- **(i)** Perennial streams
- **(ii)** Intermittent streams
- **(iii)** Ephemeral streams **(9 marks)**

b) (i) Define the term runoff and state typical units of measurements.

(ii) State **EIGHT** factors that affect the amount of runoff from a catchment area. **(11 marks)**

Question Four (20 marks)

a) The data in table 2 was obtained during a stream flow measurement exercise. Using the mid section method, calculate:
   (i) The stream flow
   (ii) The mean velocity of flow **(14 marks)**

Distance from left water edge (m)	0	1	2	3	4	5	6	7
Depth of vertical (m)	0.00	1.25	2.00	3.00	2.50	2.00	1.50	0.00
Mean Velocity in Vertical m/s	0.00	0.40	0.63	0.80	0.68	0.65	0.55	0.00

Table 2

b) The depth of flow at a vertical in a stream is 3.5m. The velocity of flow at various points in the vertical as measured by a current meter are given in table 3. Determine the mean velocity for the vertical using:

Position of meter below water surface (m)	0.7	1.4	2.1	2.8
Velocity m/s	3.28	3.16	2.94	2.62

Table 3

   (i) Single point method
   (ii) Two point method
   (iii) Three point method **(6 marks)**

Question Five (20 marks)

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

b) In an artesian aquifer 8m thick, a 10cm diameter well is pumped at a constant rate of 100l/min. The steady state draw down in two wells located 10m and 50m distances from the centre of the well are 3m and 0.05m respectively. Compute.

(τ)

   (i) Transmissitivity of the aquifer in m^2/day
   (ii) Hydraulic conductivity of the aquifer in m/day (coeff of permeability k) **(10 marks)**