



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)
Faculty of Engineering and Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING
UNIVERSITY EXAMINATION FOR DEGREE IN BACHELOR OF SCIENCE
IN BUILDING & CIVIL ENGINEERING (YR IV SEM II)

ECE 2410: HYDROLOGY II

END OF SEMESTER EXAMINATION

SERIES: DECEMBER 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)** from **SECTION A** and any other **TWO** questions from **SECTION B**

Maximum marks for each part of a question are clearly shown

This paper consists of **THREE** printed pages

SECTION A (COMPULSORY)

Question 1

- a) What is a hydrograph? (2 marks)
- b) On a sketch of a flood hydrograph and requisite precipitation hydrograph, show rainfall peak, peak discharge, lag time, rising limb, recession (falling) limb and base flow. Give brief description of each (11 marks)
- c) Define a unit hydrograph (2 marks)
- d) What is the significance of base flow separation? (5 marks)
- e) Define flow routing (2 marks)
- f) Outline **FOUR** activities that could influence base flow (8 marks)
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SECTION B (Answer any TWO questions from this section)

Question 2

- a) Outline the **THREE** sets of factors that determine the nature of a stream hydrograph (10 marks)
- b) For a rectangular basin with a single drainage channel centrally located and flowing along the longer side of the basin;
(Length = 15km, width = 10km). Define and estimate;
- (i) Form factor
 - (ii) Circulatory ratio
 - (iii) Eelongation ratio
- (10 marks)

Question 3

- a) Briefly describe the concept of Reservoir routing or (level pool routing). (8 marks)
- b) A reservoir detaining flood flows is 4.356 ha in horizontal area, has vertical sides and has a 5m diameter reinforced concrete pipe as an outlet structure. The headwater discharge relation for the outlet pipe is given in table 1. Use the level pool routing method to calculate the storage outflow function value (8 marks)

Plot the results

Table 1

Elevation (m)	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
Discharge m ³ /s	0	3	8	17	30	43	60	78	97	117	137	156

Elevation (m)	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0
Discharge m ³ /s	173	190	205	218	231	242	253	264	275

Table 2

Time (Min)	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Inflow m ³ /s	0	60	120	180	240	300	360	320	280	240	200	160	120	80	40	0

Question 4

- a) Define a flood (2 marks)

- b) Outline the **THREE** dimensions of a flood that could be used when constituting measures for mitigation and management of flood damage (6 marks)
- c) Outline the main factors initiating and modifying floods (6 marks)
- d) Briefly describe some of the flood forecasting methods (6 marks)

Question 5

- a) Write short notes on the following
 - (i) Design storm (3 marks)
 - (ii) Design precipitation intensity (7 marks)
- b) Outline measures for reducing flood damage (10 marks)