TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR:

BSC IN CIVIL ENGINEERING

ECE 2410 : HYDROLOGY II

END OF SEMESTER EXAMINATION

SERIES:APRIL2016

TIME:2HOURS

DATE:10May2016

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, Drawing Instruments, Scientific calculator, examination pass and student ID

This paper consists of five questions.

Attemptquestion ONE (Compulsory) and any other TWO questions.

Question ONE (Compulsory)

a). Discuss assumptions made during derivation of unit hydrograph **(8 Marks).**

b). What is the difference between excess rainfall hyetograph and abstractions? **(6 Marks).**

c). Determine the direct runoff, Φ - index and the excess rainfall hyetograph from the observed rainfall and the stream flow data given in Table 1 below. The area of the watershed is 7.03 mi^2 **(16 Marks).**

Table 1 : Determination of Excess Rainfall Hyetograph (ERH)

Time	Observed	Direct Run off (cfs)	Excess rainfall

	Rain (in)	Flow (cfs)		
8.30	0.17	205		
9.00	0.28	246		
9.30	1.33	283		
10.00	2.20	828		
10.30	2.08	2323		
11.00	0.20	5700		
11.30	0.09	9531		
12.00		11040		
12.30		8300		
1.00		4323		
1.30		2260		
2.00		1802		
2.30		1230		
3.00		715		
3.30		394		
4.00		354		
4.30		303		

Question TWO

a). Differentiate between flood frequency curve and the flood duration curve **(4 Marks).**

b). Fill the table 2 below to determine P ($X \geq x_m$) and the return period (T) **(16 Marks)**

Table 2 : For the determination of recurrence period (T)

Year	**Annual Max Q**	**Data arranged**	**Rank**	**P($X \geq x_m$)**	**T**

1950	804	3069			
1951	1090	1982			
1952	1580	1657			
1953	487	1651			
1954	719	1642			
1955	140	1586			
1956	1583	1583			
1957	1642	1580			
1958	1586	1543			
1959	218	1303			
1960	623	1254			

Question THREE

3 a). Why is rational formula important in hydrology? Discuss the assumptions and the precautions that are made when using the formula **(8 Marks).**

b). Define the following terms as use in a unit hydrograph

i). Rainfall intensity **(1 Mark).**

ii). Time of concentration **(1 Mark).**

iii). Overland flow **(1 Mark).**

iv). Soil Conservation Service **(1 Mark).**

3b). Make short notes under the following subtopics

i). Rating curve **(2 Marks).**

ii). Flood recurrence Interval **(2 Marks).**

iii). Mean Daily Discharge **(2 Marks).**

iv). Mean Annual Discharge **(2 Marks).**

Question FOUR

The following inflow and outflow hydrographs were observed in a river reach. Estimate the values of K and x applicable to this reach for the use in the Muskingum equation **(20 Marks).**

T(hrs.)	0	6	12	18	24	30	36	42	48	54	60	66
Inflow (m^3/s)	5	20	50	52	32	22	15	10	7	5	5	5
Outflow (m^3/s)	5	6	12	30	40	36	29	23	18	14	9	8

Question FIVE

Given the table 2 below, fill in to determine the Direct Runoff Hydrograph **(20 Marks).**

Table 4

Time	**UH_3**	**0.5 UH_3**	**1.5 UH_3**	**3- hrs lagged 1.5UH_3**	**6- hrs lagged 1.5UH_3**	**DRH**
(hrs)	**(cfs/in)**	**(cfs)**	**(cfs)**	**(cfs)**	**(cfs)**	**(cfs)**
0	0					
1	40					
2	100					
3	140					
4	180					
5	200					
6	195					
7	150					
8	135					
9	110					
10	80					
11	50					
12	24					
13	0					
14	0					
15	0					
16	0					
17	0					
18	0					