UNIVERSITY OF JOHANNESBURG

PROGRAM	:	**BACHELOR OF ENGINEERING TECHNOLOGY**
SUBJECT	:	**HYDROLOGY B2**
CODE	:	**HYOCIB2**
DATE	:	SEMESTER-MAIN EXAMINATION November 2019 (SECOND SESSION)
DURATION	:	(Y-PAPER) 8:30-11:30
WEIGHT	:	40:60
FULL MARKS	:	100
TOTAL MARKS	:	100

EXAMINER	:	Mr. A. Vessal	SAPSE NO
MODERATOR	:	Prof . I. Musonda	FILE NO
NUMBER OF PAGES	:	5 PAGES	
INSTRUCTIONS	:	CALCULATORS ARE PERMITTED (ONLY ONE PER STUDENT)	

REQUIREMENTS	:	GRAPH PAPER, RULER

INSTRUCTIONS TO STUDENTS:

1. ANSWER ALL QUESTIONS IN PEN NOT IN PENCIL
2. Show all your calculations to get a full mark
3. Return your test sheet and all loose sheets with your answer sheet to the examiner

QUESTION 1

A storm occurs over a 9000 hectare watershed .The measured rainfall and streamflow are shown in the following tables. Derive the UH from the data. What fraction of the rainfall in cm are being lost as interception, infiltration and what fraction produces Direct runoff.

Time,	6-7 AM	7-8 AM	8-9 AM	9-10 AM	10-11 AM	6-7 AM
Rainfall(mm)	10	16	28	24	12	6

Tme, Hour	streamflow,m^3/s	Base flow,m^3/s
4.00	3.142857	1.5
6.00	17.14286	1.5
8.00	21.42857	1.5
10.00	28.57143	1.5
12.00	24.85714	1.5
14.00	18.42857	1
16.00	7.428571	1

[18]

QUESTION 2

A water supply reservoir has been lined with clay to limit the leakage through the bottom. The following data have been collected for 4 days. The surface are of o the lake is 40 hectare. The reservoir surface elevation drops 12 cm during this period and the evaporation is 13 cm. what is the amount of leakage in cm and m^3 during this period. Is this clay liner effective?

Parameter	Day 1	Day 2	Day 3	Day 4
Stream inflow,m^3/s	0	0.21	0.43	0.51
Stream outflow,m^3/s	0	0.14	0.35	0.25
Rainfall,cm	0	1.5	7.0	2.5
city use	0.34	0.21	0.31	0.23

$P + Q_i - Q_o - I - E - T = \Delta S$

[18]

QUESTION 3

The following are the ordinates of 4 hr UH . Derive the 8 hr unit hydrograph of the basin using superposition method.

Hour	4hr UH
0.00	0
2.00	9
4.00	14
6.00	20
8.00	13
10.00	8
12.00	5
14.00	0

[18]

QUESTION 4

1. Determine 10 yr precipitation for the following data using Log Pearson Type 3.
2. calculate the return period for the 2002 rainfall using lognormal distribution

The K values are in annexures.

Year	Rainfall (mm)
2000	1382.600
2001	1278.900
2002	1555.800
2003	1223.400
2004	1319.100

[14]

QUESTION 5

A flood occurs before the storage pool of reservoir is empty. Given the following information Determine the outflow during the flood.

stage(m,MSL)	outflow	storage	2S/Δt	2S/Δt+O
	0	0	0	0
0.5	22.6	408	113.3333	135.9333
1	65	832	231.1111	296.1111
1.5	117	1275	354.1667	471.1667
2	117	1720	477.7778	594.7778

time(hr)	Ii (m^3/s))	Ij (m^3/s))	2S/Δt-Oi	2S/Δt+Oj	O(m^3/s)
0	12		40		6
2	22				
4	32				
6	85				
8	109				
10	64				
12	18				

[20]

QUESTION 6

A portion of a reservoir routing table are shown below (Δt= 300 seconds). Fill in the blanks.

Stage(H),m	Outflow(m^3/s)	Storage(m^3)	2S/Δt+O(m^3/s)
0	0	0	
2	1.37	271.26	
4	3.1		13.1284
6	4.1		34.1852

[12]

[TOTAL : 100]