(*University of Choice*)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN CAMPUS

**UNIVERSITRY EXAMINATIONS
2019/2020 ACADEMIC YEAR**

THIRD YEAR SECOND SEMESTER EXAMINATIONS

**FOR THE DEGREE
OF
BACHELOR OF SCIENCE IN CIVIL AND STRUCTURAL
ENGINEERING**

COURSE CODE: CSE 354

COURSE TITLE: HYDROLOGY

DATE: Tuesday 10ᵀᴴ November 2020 TIME: 9.00 – 11.00 am

INSTRUCTIONS:
1. This paper contains FOUR questions
2. Answer question ONE (compulsory) and any other TWO question
3. Marks for each question are indicated in the parenthesis.
4. Examination duration is **2 Hour**

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 2 Printed Pages. Please Turn Over.

QUESTION 1 [30 MARKS]
(a) Distinguish between the following as used in groundwater studies
    i.   Drawdown and radius of influence   [3 Marks]
    ii.   Specific storage and Specific retention   [3 Marks]
(b) Derive the equation for steady radial flow in a confined aquifer and state the   assumptions made.   [14 Marks]
(c) A confined aquifer has a total thickness of 30m with the original piezometric head being 65m. The aquifer is fully penetrated by a well of diameter 40cm and pumped at a rate of 2.0m^3/min. Two observation wells at a distance of 125m and 160m from the pumping well has a hydraulic head of 64m and 64.5m respectively. Determine the coefficient transmisivity of the aquifer and the drawdown at the pumping well.   [10 Marks]

QUESTION 2 [20 Marks]
(a) Differentiate between the direct runoff and overland flow   [3 marks]
(b) Define UH , its implications and assumptions made   [9 marks]
(c) Given the ordinates of a 2-h unit hydrograph below, derive the ordinates of a 6-h unit hydrograph using S-Curve method.   [8 Marks]

Time (h)	0	2	4	6	8	10	12	14	16	18	20	22
Ordinates of 2-h UH	0	20	50	100	110	125	120	65	35	15	10	0

QUESTION3 [20 Marks]
(a) Differentiate between the following as used in hydrological frequency studies:
    i. Plotting position and Return Period   [4 marks]
    ii. Risk and Reliability   [4 marks]
(b) Given the following 16 years of extreme flow sample data from a population of unknown mean and standard deviations, estimate the magnitude of the annual maximum flow rate with a return period of 25 years. 89, 80, 100, 98, 101, 112, 95, 105, 97, 115, 103, 99, 107, 111, 96, 70   [10 marks]
(c) For the return period in Q3(b) above, What is the estimated lifespan of the project if the engineer is allowed 6.3%?   [2 marks]

QUESTION 4
(a) Define flood routing and discuss the importance of reservoir routing   [4Marks]
(b) Differentiate between Hydraulic and hydrological routing   [3 marks]
(c) Using Muskingum method for flood routing, determine the following hydrograph through a river reach for which K=11.0h and x = 0.12. At the start of the inflow flood, the outflow is 8.5m^3/s.   [13 marks]

Time (h)	0	3	6	9	12	15	18	21	24
Inflow(m^3/s)	15	24	48	65	90	76	57	36	22