MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS
2018/2019 ACADEMIC YEAR

SECOND YEAR FIRST SEMESTER EXAMINATIONS

FOR THE DIPLOMA

IN

CIVIL ENGINEERING AND WATER TECHNOLOGY

COURSE CODE: DCE 077

COURSE TITLE: HYDROLOGY

DATE: Monday 4ᵀᴴ February 2019 TIME: 3.00pm – 5.00pm

INSTRUCTIONS:
1. This paper contains **FOUR** questions
2. Question **ONE** is **COMPULSORY**
3. Attempt any other **TWO** questions
4. Marks for each question are indicated in the parenthesis.
5. Examination duration is **2 Hours**

MMUST observes ZERO tolerance to examination cheating

QUESTION ONE - COMPULSORY (30 MARKS)

a. Discuss the **two** main methods for estimating missing precipitation data, highlighting the estimation procedure in each case   (8 Marks)

b. Describe, with the aid of a well-labelled diagram, the hydrological cycle   (6 Marks)

c. The river gauging measurements given below were carried out by wading on River Nzoia at RGS 4F17.   (10 Marks)

Distance (m)	50	60	70	80	90	100	110	120	130	140
Depth (m)	0	0.65	0.71	1.42	1.19	1.33	1.75	1.62	1.31	0
Velocity (m/s)	0	0.27	0.327	0.421	0.459	0.478	0.459	0.421	0.327	0

Calculate the discharge of River Nzoia from the data above using the mid-section method

d. Outline any **six** factors to consider before siting a rain gauge.   (6 Marks)

QUESTION TWO (20 MARKS)

a) Explain the procedure for velocity-area river discharge measurement method   (6 Marks)

b) ii. State the formula for arithmetic mean method of missing precipitation data estimation.

(2 Marks)

ii. Use this formula to estimate the missing precipitation data for station X below

(2 Marks)

Station	Precipitation (mm)	Normal Annual Precipitation (mm)
A	35	1020
B	33	1010
X	-	1000
C	31	980

c. Using diagrams explain the types of precipitation likely experienced in these areas (10 Marks)

    i. Kisumu region

    ii. Mount Kenya region

QUESTION THREE (20 MARKS)

a) As a young engineer, a client residing within Kakamega town sought your advice on suitable water harvesting techniques. Discuss in details any two water-harvesting techniques (options) available to your client, and highlight your preferred choice, giving reasons. (10 Marks)

b) The table below shows point rainfall due to a storm at several rain-gauge stations in a water catchment. Complete the table and determine the mean areal depth of rainfall (5 Marks)

Station	Rainfall recorded, P_1 (cm)	Area of influential polygon, $A_1(Km^2)$	A_1P_1 (Km^2 - cm)
1	8.8	57	
2	7.6	92	
3	10.8	62	
4	9.2	52	
5	13.8	55	

c. Using illustrations, discuss the components of a hydrograph (5 Marks)

QUESTION FOUR (20 MARKS)

a. Discuss any **five** factors that affect the rate of evaporation (10 Marks)

b. The cross sectional area of a stream was measured and determined to be 30, 000 cm^2. The average velocity of the stream as measured by current meter was 0.8 m/s. Calculate the stream discharge using velocity area method. (4 Marks)

c. Discuss application of any **three** meteorological elements in forecasting. (6 Marks)