Faculty of Engineering & Technology

Department of Building & Civil Engineering

UNIVERSITY EXAMINATION FOR DIPLOMA IN:

DIPLOMA IN CIVIL ENGINEERING (DBCE y3s2)

ECV 2305: HYDROLOGY

END OF SEMESTER EXAMINATION

SERIES: MAY 2016

TIME ALLOWED: 2 HOURS

<u>**Instruction to Candidates;**</u>

You should have the following for this examination;
- *Answer booklet*
- *Pocket calculator*

*This paper consists of FIVE questions. Answer **ANY THREE** questions.*
Use neat, large and well labelled diagrams where required
Maximum marks for each part of a question are as shown
*This paper consists of **THREE** printed papers.*

Question One

    a) Briefly explain FOUR methods used to convert areal estimates in a single point precipitation.

(12 marks)

    b) Define a wetland.

(2 marks)

    c) Briefly explain FOUR factors that affect evapotranspiration.

(6 marks)

Question two

    a) Briefly state the function of hydrology in water resources development.

(4 marks)

    b) Briefly explain TWO types of rain gauge.

(6 marks)

    c) Rain-gauge station D was inoperative for part of a month during which a storm occurred. The storm rainfall recorded in the three surrounding stations A, B and C were 7.5, 10.7 and 9.3 cm, respectively. If the average annual rainfalls for the stations are 75, 84, 70 and 90 cm, respectively, estimate the storm rainfall at station D.

(5 marks)

    d) The annual rainfall at station X and the average annual rainfall at 18 surrounding stations are given below. Check the consistency of the record at station X and determine the year in which a change in regime has occurred. State how you are going to adjust the record for the change in regime.
Determine the average annual rainfalls for the period 1952-1970 for the changed regime.

Year	*Annual rainfall (cm)*	
	Stn. X	**18-stn. average**
1952	30.5	22.8
1953	38.9	35.0
1954	43.7	30.2
1955	32.2	27.4
1956	27.4	25.2
1957	32.0	28.2
1958	49.3	36.1
1959	28.4	18.4
1960	24.6	25.1
1961	21.8	23.6
1962	28.2	33.3
1963	17.3	23.4
1964	22.3	36.0
1965	28.4	31.2
1966	24.1	23.1

1967	26.9	23.4
1968	20.6	23.1
1969	29.5	33.2
1970	28.4	26.4

(5 Marks)

Question three

a) Define the following hydrologic processes and briefly explain the importance of each component to the hydrologic cycle.
   (i)   Surface runoff
   (ii)   Groundwater flow
   (iii)   Evapotranspiration

(10 marks)

b) Briefly explain the differences between confined and unconfined aquifers.

(5 marks)

c) Briefly explain what a runoff hydrograph is.

(2 marks)

d) Briefly explain main properties of a watershed that influence a runoff hydrograph.

(3 marks)

Question Four

a) State FOUR forms of precipitation.

(2 marks)

b) Briefly explain the hydrologic equation.

(4 marks)

c) With the help of a neat sketch, explain the hydraulic cycle in nature indicating its various phases.

(14 marks)

Question five

a) An unregulated river has monthly mean flow (m^3/s) as follows;

Jan	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
4.5	6.7	8.2	8.0	5.5	5.6	6.3	9.3	12.5	17.7	15.2	10.0

Allowing compensation water of 4.0 m^3/s and reservoir losses of 0.6 m^3/s;
Determine;
   i)   Storage capacity of the reservoir to ensure no spilling
   ii)   Average net yield of the reservoir

(20 marks)