SOUTH EASTERN KENYA UNIVERSITY

UNIVERSITY EXAMINATIONS 2017/2018

FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN HYDROLOGY AND WATER RESOURCES MANAGEMENT

WRM 201: SURFACE WATER HYDROLOGY

DATE: 5th DECEMBER, 2017   **TIME: 10.30-12.30 P.M**

Instructions:

a) Answer ALL questions in Section A (30 marks)

b) Answer any two (2) questions in Section B (40 marks)

c) Maximum marks for each question are shown.

d) Illustrate your answers with carefully drawn sketches and diagrams, where necessary.

e) Time allowed: 2 hours.

SECTION A

1. Using clear illustrations, explain how shape of a drainage basin and stream density affects the shape of a streamflow hydrograph   (5 marks)

2. Explain how effluent and influent streams in arid and semi arid lands exchange water with groundwater aquifers and bank storage   (5 marks)

3. Using a well-illustrated diagram, explain the five (5) main components of a streamflow hydrograph   (5 marks)

4.   (a) Write and define the terms of the equation that is used to describe the hydrograph of baseflow
                                        (2 marks)

(b) Write and define the terms of the simple inverse exponential function that is used to describe normal groundwater depletion curve (3 marks)

5. Assuming that a small impervious area is subjected to rainfall at a constant rate, with the aid of a diagram, explain the hydrologic processes that will affect the resulting hydrograph (5 marks)

6. (a) What is a unit hydrograph of a watershed? (1 marks)

   (b) Explain the four (4) fundamental assumptions in the use of unit hydrographs (4 marks)

SECTION B

7. The following table shows the observed direct river discharge measured at half hourly intervals, in a river system draining an arid and semi arid river basin. Using the data shown in the table, derive a unit hydrograph using net-precipitation depth-direct runoff method. Assume the river basin area to be 1,000 Km^2 (20 marks)

½ Hours	Observed Direct Discharge (Q) (m3/s)
1	10
2	70
3	200
4	460
5	1780
6	3880
7	3160
8	1120
9	620
10	340
11	150
12	70
13	20

8. (a) Discuss the three (3) main parameters that are used in the derivation of synthetic unit hydrographs (12 marks)

(b) Explain any four (4) main applications of unit hydrographs (8 marks)

9. (a) Using a diagram, discuss the main components of runoff paying special attention to flow paths in a river basin with both steep and gentle gradients (10 marks)

   (b) Using illustrations, explain how you'll use the flow mass curves to design reservoirs for rural and urban water supply (10 marks)