OLABISI ONABANJO UNIVERSITY, AGO-IWOYE
FACULTY OF SOCIAL AND MANAGEMENT SCIENCES
DEPARTMENT OF GEOGRAPHY
2015/2016 HARMATTAN SEMESTER EXAMINATIONS
B.Sc. Degree Examinations

COURSE CODE: GRP 417
COURSE TITLE: Hydrology
TIME ALLOWED: 2 Hours
INSTRUCTION: Answer Question 1 and any other two (2) questions of your choice.

Q.1 (a) Ago-Iwoye, is a town sitting at an elevation of ~200 m above sea level to the east of the Erigba Mountains and west of Oru. The Igan Creek, which is a tributary of the Ome River, flows right through the centre of Ago-Iwoye. Starting on April 9, 2016, a weather system stalled over this area of Ogun State and dropped almost 20 mm of rain over the following week. To put this in perspective, this area generally sees 20 mm of rain over the course of an entire month. On April 12, streamflow reached 100 m^3s^{-1}! The resulting flood is one of the worst recorded natural disasters the town has ever seen. Imagine you are working for the Ogun State Ministry of Environment, what would you do to assess the problem and help the town to be more prepared for future flooding scenario in order to protect its inhabitants?

(b) Examine the historical development of the science of hydrology (modified after Chow, 1964).

Q.2 (a) A rain gauge 'D' was inoperative during a specific storm. The rainfall recorded at three surrounding stations A, B and C during that storm was 52, 85 and 70 mm respectively. If the average annual rainfall of stations A, B, C and D are 650, 900, 820 and 700 mm respectively, estimate the storm rainfall of station D.

(b) Explain in details with neat sketches the "Hydrological cycle" and illustrate its applications.

Q.3 (a) Excess rainfall (direct runoff) produced from a 10.8 cm rainfall of a storm is 6.0 cm and the rainfall at each hour of the storm recorded by a rain gauge is given below. Calculate the infiltration index of the storm.

Time (h)	1	2	3	4	5	6	7	8
Incremental rainfall (cm)	0.1	0.1	3.4	2.6	2.0	1.5	1.0	0.4

(b) Highlight and discuss types of aquifers with relevant illustrations.

Q.4 (a) Critically examine the concept of drainage basin and describe River Basin management in Nigeria.

(b) Assume a 25*km* stretch river flowing at a mean velocity of 2.5ms^{-1} is found to have an average width of 7.5*m* and a mean depth of 525*cm*, and at the bank a 20*cl* water jar is completely dispensed in 6*mins*. Calculate:

(i) Average width-depth ratio
(ii) Total channel volume
(iii) Mean discharge
(iv) Infiltration rate

Q.5 (a) In a watershed that is 3.5 km^2, the volume of annual precipitation was 5,000 m^3 and the volume of water that was evaporated was 400 m^3. Estimate the volume of annual runoff (m^3) if storage is 200 m^3 and groundwater fluxes are negligible.

(b) Write short notes on the following:

(i) Orographic precipitation
(ii) Evapotranspiration
(iii) Types of clouds
(iv) Groundwater movement
(v) "Water will always find its course"