



ELIZADE UNIVERSITY, ILARA-MOKIN
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING
CVE 304:HYDROLOGY

EXAMINATION FOR SECOND SEMESTER 2018/2019 SESSION

Instructions: Answer either question 2 or 3 plus either question 4 or 5 plus question 1. Answer
Three questions in all, Question 1 is compulsory

Time Allowed: 2¹/₂ Hrs

2 units

Question 1 - (20 marks)

- a) Explain briefly what you understand as hydrology cycle. (5 marks)
- b) Mention and explain the components of hydrology that you know. (5 marks)
- c) The volume of the ocean is 1,338,000,000 km³ and the flux rate is approximately the same (1,580 km³/day). What is the average residence time of a water molecule in the ocean? (5 marks)
- d) Highlight the consequences of drought that you know under 3 groups. (5 marks)

Question 2 - (20 marks)

- a) Define what you understand as floods and droughts. What causes them? (5 marks)
- b) Mention and briefly discuss the Strategies for drought protection, mitigation or relief. (5 marks)
- c) The data below showed the flood distribution of CAD . Using the data provided, compute the standard deviation, variance and coefficient of skew for the frequency distribution. Comment on the nature of the skewness. (10 marks)

Table Q2:Annual maximum flow for CAD

Year	Annual Maximum flow (m ³ /s)
1940	55.6
1941	39.8
1942	37.0
1943	43.3
1944	19.6
1945	45.5
1946	27.1
1947	29.0
1948	53.2
1949	51.7
1950	36.2
1951	18.8
1952	26.3

1953	44.4
1954	37.6
1955	16.5
1956	13.4
1957	19.1
1958	28.3
1959	38.4
1960	37.1
1961	40.7
1962	45.2
1963	29.0
1964	50.5
1965	25.5
1966	38.9
1967	51.1
1968	15.2

Question 3 - (20 marks)

- a) Define and distinguish between deterministic and probabilistic analysis in hydrology. (3 marks)
- b) List the characteristics of the normal distribution graph, support your answer with diagrams. (4 marks)
- c) By definition, the random variable X in normal distribution has a range of $-\infty < x < \infty$. However, most hydrological variables are bounded by $X=0$. Explain/ justify the use of normal distribution in some instances even though the hydrological variable under consideration may be bounded by $X=0$. (3 marks)
- d) Suppose the flood distribution X is normal with mean $12\text{m}^3/\text{s}$ and standard deviation $6\text{m}^3/\text{s}$. Find;
- i. The probability $P(7.6 < X < 12)$
 - ii. The X value so that only 20% of all values are below X .
(See the normal distribution Table attached) (10 marks)

Question 4 – (20 marks)

- a) Using the graphical features of a hydrograph describe the various components of hydrograph that you know. (4 marks)
- b) State the basic assumptions in unit hydrograph. (4 marks)
- c) State 5 physical factors that can influence the shape of a hydrograph. (4 marks)
- d) The ordinate of 4 hrs unit hydrograph(UH) is given Table Q4, assume base flow is $20\text{m}^3/\text{s}$. Derive the 8hrs UH and draw the UH. (8 marks)

Table Q4

Time (hrs)	Ordinate of 3hrs UH (m^3/s)
0	0
4	6
8	17
12	22
16	23
20	28
24	87
28	96
32	130
36	170
40	195
44	220
48	250
52	248
56	212
60	194
64	139
68	99
72	87
76	76
80	65
84	45
88	30
92	10
96	8
100	0

Question 5 – (20 marks)

- a) What is Hydrograph? Enumerates the types of hydrograph that you know. **(4 marks)**
- b) What are the uses of hydrograph? **(2 marks)**
- c) What is flood routing? Explain what you understand as translation and attenuation in flood routing, support with diagram. **(4 marks)**
- d) Using the data in Table Q4 above, derive the direct run off or flood hydrograph of the 4hrs UH for 2cm excess rainfall. Draw the flood hydrograph. Assume base flow is $15\text{m}^3/\text{s}$. **(10 marks)**