



FACULTY OF ENGINEERING

DEPARTMENT OF CIVIL ENGINEERING  
SECOND SEMESTER EXAMINATION  
(AUGUST 2018)  
2017/2018 ACADEMIC SESSION

**Course Title: HYDOLOGY**

**Course Code: CVE 304**

HOD'S SIGNATURE

**Instructions:**

- 1) Answer questions 1 and any other three (remember to use required equations and expressions)
- 2) Time Allowed: 3 hours
- 3) SEVERE PENALTIES APPLY FOR MISCONDUCT, CHEATING, POSSESSION OF UNAUTHORIZED MATERIALS DURING EXAMINATION



**FACULTY OF ENGINEERING**  
**DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING**  
**B.Sc (Civil Engineering) Degree Examination**  
**Second Semester 2017/2018 Session**  
**CVE 304: HYDROLOGY**

August 2018

Time Allowed: 3 hours

**Instruction:** Answer questions 1 and any other three (remember to use required equations and expressions)

**QUESTION 1 (30 Marks)**

- a) Write a short note on flood routing. (5 marks)
- b) Table Q1 presents stream flow from a certain river in respect to time of the day after a heavy rainfall. Using the table provide the hydrograph of the flow. (5 marks)
- c) Determine as stated as follows:
- i. a linear relationship between the flow and the time. (5 marks)
  - ii. a non- linear relationship between the flow and time. (5 marks)

Table Q1: Stream flow data from a selected river

Time (hr)	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00
Flow (m <sup>3</sup> /h)	1.50	2.50	3.50	4.50	7.00	3.60	3.00	2.00	2.10

- d) The average annual discharge of river having basin area of  $2.96 \times 10^6 \text{ m}^2$  is  $100 \times 10^9 \text{ m}^3$ . Calculate the discharge per unit area in  $\text{m}^3/\text{s} / \text{km}^2$ . (4 marks)
- e) On a warm summer day, the air temperature is reported to be  $182^\circ\text{K}$  with wind speed of  $2.9 \text{ m/s}$ . Calculate as follows:
- i. the saturated vapour pressure. (2 marks)
  - ii. the relative humidity. (2 marks)
  - iii. evaporation (2 marks)

**QUESTION 2 (10 marks):**

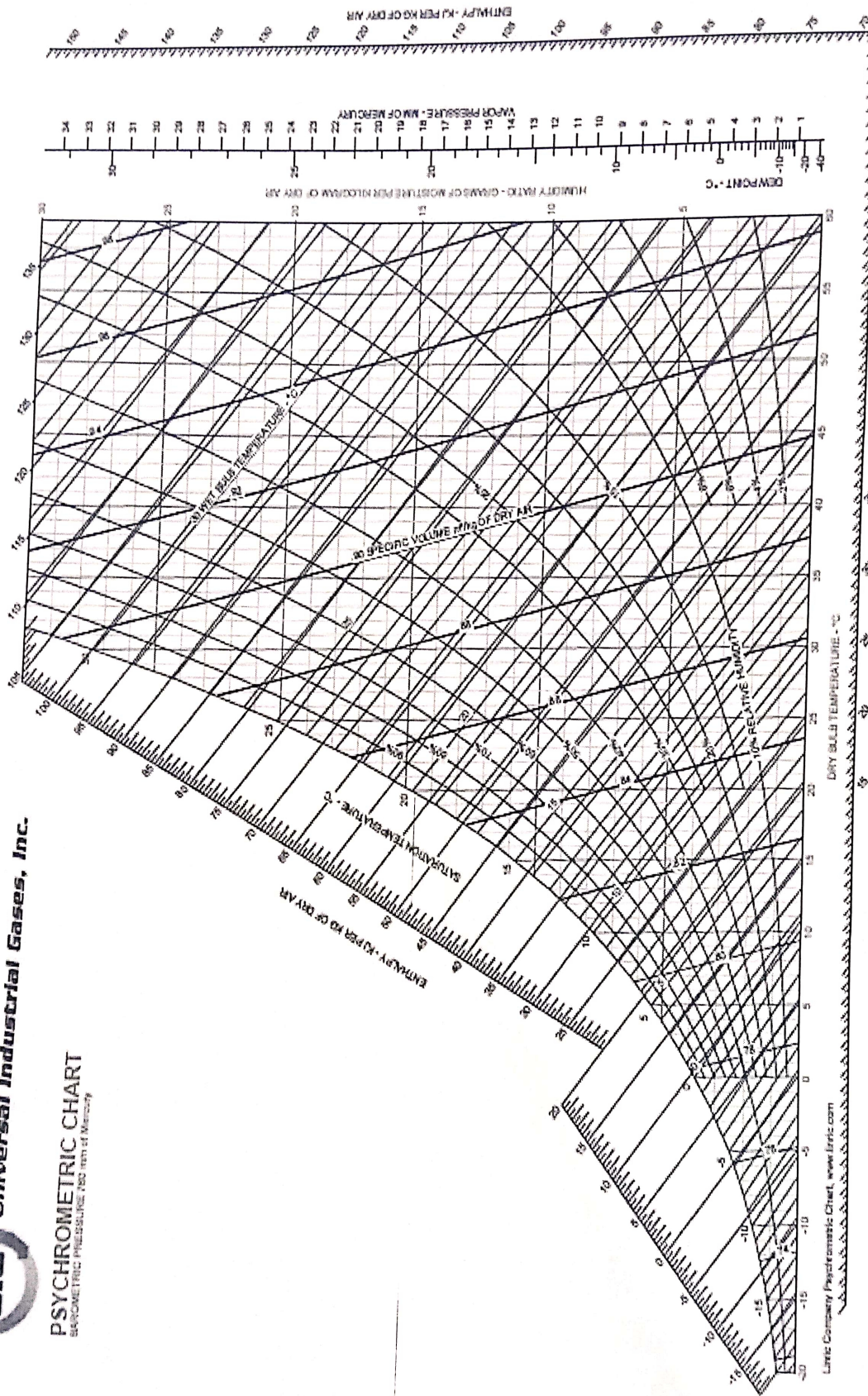
- a) Explain the term atmosphere. (4 marks)
- b) Table Q2 presents rainfall in a selected location using different rain gauges. Use the table to answer the following questions as required:
- a. Calculate the arithmetic mean of the rainfall. (2 marks)
  - b. Calculate the standard deviation of the rainfall. (2 marks)
  - c. Calculate the coefficient of variation of the rainfall. (2 marks)



Universal Industrial Gases, Inc.

### PSYCHROMETRIC CHART

BAROMETRIC PRESSURE: 100 mm of Mercury



Linc Company Psychrometric Chart, www.linc.com

Table Q2: Rainfall data from selected rain gauges

Rain gauge	A	B	C	D	E	F
Depth of Water (mm)	4.81	6.25	5.16	4.98	5.26	5.87

**QUESTION 3 (10 marks):**

Write a brief note on the following terms (provide necessary diagram or equations as the case may be):

- a. Hydrological Cycle. (5 marks)
- b. Evaporation. (5 marks)

**QUESTION 4 (10 marks):**

Write a detailed note on the methods for measuring flow from a stream. (10 marks)

**QUESTION 5 (10 marks):**

Write a detailed note on the following term (provide necessary diagram or equations as the case may be):

- a. Relative Humidity. (6 marks)
- b. Specific Humidity. (2 marks)
- c. Absolute Humidity. (2 marks)

**QUESTION 6 (10 marks):**

Answer the following questions as required.

- a. On a warm summer day, the air temperature was reported to be 35 °C with relative humidity of 40 %. Determine as follows:
  - i. Saturated vapour pressure. (3 marks)
  - ii. Dew point temperature. (3 marks)
- b. In the evening, the temperature dropped to 30 °C. What is the relative humidity? (4 marks)

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Depth of Water (mm)	4.81	6.25	5.16	4.98	5.26	5.87

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Dry Bulb (°C)	Number of degrees difference between the wet- and dry-bulb readings (°C)									
	1	2	3	4	5	6	7	8	9	10
10	88%	77	66	56	45	35	26	16	7	--
11	89	78	67	57	47	38	28	19	11	2
12	89	79	68	59	49	40	31	22	14	5
13	89	79	69	60	51	42	33	25	16	9
14	90	80	70	61	52	43	35	27	19	11
15	90	80	71	62	54	45	37	29	22	14
16	90	81	72	63	55	47	39	31	24	17
17	91	82	73	64	56	48	41	33	26	19
18	91	82	73	65	57	50	42	35	28	21
19	91	82	74	66	58	51	44	37	30	24
20	91	83	75	67	59	52	45	38	32	26
21	91	83	75	68	60	53	47	40	34	27
22	92	84	76	69	61	54	48	41	35	29
23	92	84	77	69	62	56	49	43	37	31
24	92	84	77	70	63	57	50	44	38	32
25	92	85	77	71	64	57	51	45	40	34
26	92	85	78	71	65	58	52	46	41	35
27	93	85	78	72	65	59	53	47	42	37
28	93	86	79	72	66	60	54	49	43	38
29	93	86	79	73	67	61	55	50	44	39
30	93	86	80	73	67	61	56	50	45	40
31	93	86	80	74	68	62	57	51	46	41
32	93	87	80	74	68	63	57	52	47	42
33	93	87	81	75	69	63	58	53	48	43
34	93	87	81	75	69	64	59	54	49	44