Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2021/2022

COURSE NAME	:	HYDROLOGY
COURSE CODE	:	DAC 20502
PROGRAMME CODE	:	DAA
EXAMINATION DATE	:	JULY 2022
DURATION	:	2 HOURS 30 MINUTES
INSTRUCTION	:	1. ANSWER **FIVE (5)** QUESTIONS ONLY. 2. THIS FINAL EXAMINATION IS AN **ONLINE** ASSESSMENT AND CONDUCTED VIA **OPEN BOOK**.

THIS QUESTION PAPER CONSISTS OF **SEVEN (7)** PAGES

Q3 (a) State **two (2)** factors affecting the infiltration process.

(2 marks)

(b) Elaborate the Flooding Type Infiltrometer as equipment in measuring infiltration rate.

(6 marks)

(c) By referring to **Table 5**, the value of direct runoff depth is 3.1 cm. Calculate the following:

(i) Φ index (cm/hr).

(9 marks)

(ii) Precipitation excess (cm).

(3 marks)

Q4 (a) Write **two (2)** factors affecting runoff capacity in the water channel.

(2 marks)

(b) Summarize **three (3)** limitations of the Rational Method in estimating peak flow.

(6 marks)

(c) By referring to **Table 6**, calculate the composite runoff coefficient.

(4 marks)

(d) By referring to **Figure Q4(d)**, assume that the stream is flowing bank full with 0.55% of the slope. Calculate the following:

(i) Wetted area (ft^2).

(2 marks)

(ii) Wetted perimeter (ft).

(2 marks)

(iii) Hydraulic radius (ft).

(2 marks)

(iv) Velocity (ft/s) in the stream.

(2 marks)

Q5 (a) Detail **two (2)** types of Dilution Method in streamflow determination.

(2 marks)

(b) Classify the characteristics of tracer properties used in the Dilution Method.

(6 marks)

(c) By referring to **Table 7**, calculate the stream discharge (m^3/s).

(4 marks)

(d) By referring to **Table 8**, determine the Unit Hydrograph Ordinate value (m^3/s per cm) when the runoff depth is 3.15 cm.

(8 marks)

Q6 (a) State **two (2)** types of zones in an unconfined aquifer.

(2 marks)

(b) Elaborate groundwater parameters storage.

(6 marks)

(c) By referring to **Table 9**, determine the discharge (m^3/s) from the well.

(12 marks)

Q7 (a) Recognize flood routing which is related to flow rate and flow depth.

(2 marks)

(b) Clarify Pulse Method which is applied in reservoir routing.

(6 marks)

(c) By referring to **Table 10**, calculate the following:

(i) Storage (ft^3/s – day) in the reservoir.

(4 marks)

(ii) Outflow (ft^3/s) which the length of the spillway is 35 ft.

(4 marks)

(iii) Final discharge (ft^3/s) based on the water elevation.

(4 marks)

- END OF QUESTIONS –

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Table 1

Day	Evaporation (mm)	Precipitation (mm)	Measured Level (mm)
1	35	0	1599
2	9	17	-
3	15	9	-
4	11	19	-
5	31	0	1377

Table 2

Month	Inflow (m^3)	Outflow (m^3)
June	35	15
July	53	17
August	59	9
September	19	13
October	31	11
November	31	13
December	39	19

Table 3

Station	Area (m^2)	Precipitation (cm)
P	915	7.5
Q	955	7.7
R	975	7.9
S	11591	9.1
T	11335	9.5
U	15519	9.7

Table 4

Isohyetal Interval (mm)	Area (km^2)
0 – 50	93
50 – 100	75
100 - 150	33

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Table 5

Time (hr)	1	2	3	4	5
Rainfall Intensity (cm/hr)	0.9	3.9	5.1	3.5	1.3

Table 6

Surface Type	Area (acre)	Runoff Coefficient, C
Commercial properties	11	0.15
Residential areas	15	0.35
Grass areas	37	0.3
Forested areas	13	0.75

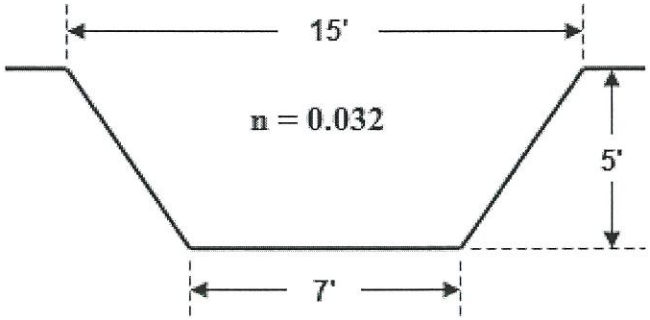

Figure Q4(d)

Table 7

Item	Value
Rate of tracer	19 cm^3/s
Initial concentration	3 X 10^{-10} gm/m^3
Concentration at section 1	0.035 gm/m^3
Concentration at section 2	7 X 10^{-9} gm/m^3

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Table 8

Time (hour)	Total Flow (m^3/s)	Baseflow (m^3/s)
1	3.90	3.90
2	4.30	3.80
3	5.35	3.70
4	7.50	3.60
5	9.55	3.50
6	13.55	3.40
7	7.35	3.30
8	3.20	3.20

Table 9

Item	Value
Hydraulic conductivity	10500 m/min
Radial distance from observation well 1 to pumped well	0.035 km
Drawdown at observation well 1	9 m
Radial distance from observation well 2 to pumped well	7500 cm
Drawdown at observation well 2	7 m
Aquifer thickness	77 m

Table 10

Head, H (ft)	Storage (Acre-ft)
0	311
1	331
2	355
3	359
4	371
5	375
6	393
7	399