UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2012/2013

COURSE NAME	:	HYDROLOGY
COURSE CODE	:	DAC 20902
PROGRAMME	:	2 DAA / DAC
EXAMINATION DATE	:	OCTOBER 2012
DURATION	:	2 ½ HOURS
INSTRUCTIONS	:	ANSWER **FOUR (4)** QUESTIONS ONLY

THIS QUESTION PAPER CONSISTS OF SIX (6) PAGES

Q1 (a) What do you understand about water balance equation.

(6 marks)

(b) List **4 (FOUR)** parameters in hydrological data collection.

(4 marks)

(c) Refer **Table Q1(c)**, a reservoir has the following inflows and outflows for the three months of the year. If the storage at the beginning of June is 62 m^3, determine the storage at the end of August.

Table Q1(c) : Data of inflow and outflow

Month	June	July	August
Inflow (cm^3)	3.45 X 10^6	5.56 X 10^6	8.89 X 10^6
Outflow (cm^3)	6.67 X 10^6	7.88 X 10^6	5.67 X 10^6

(5 marks)

(d) A catchment of an area of 19,500 km^2 receives an annual rainfall of 66 cm/annum. Discharge from the catchment is 161 m^3/s. Determine the annual evaporation value (ET) for the catchment.

(10 marks)

Q2 (a) Explain briefly about precipitation types as below:

i) Convective precipitation
ii) Orographic precipitation
iii) Cyclonic precipitation

(6 marks)

(b) List **4 (FOUR)** parameters of precipitation measurement.

(4 marks)

(c) Refer **Table Q2(c)**, determine cumulative rainfall (cm) and rainfall intensity (cm/hour).

Table Q2(c) : Rainfall data

(10 marks)

Time	0	10	20	30	40	50	60	70	80
Rainfall (mm)	17	22	26	32	35	38	40	42	43

(15 marks)

Q3 (a) Explain the procedures of plotting Intensity Duration Frequency (IDF) curve.

(10 marks)

(b) Refer **Table Q3(b)**, determine Intensity Duration Frequency (IDF) for 20-year and 10-year frequencies.

Table Q3(b) : Precipitation data

No	5 min	10 min	15 min	20 min	30 min	60 min
1	0.33	0.62	0.89	0.86	1.48	0.77
2	0.37	0.60	0.76	1.07	0.82	0.80
3	0.31	0.58	0.73	0.77	1.29	0.83
4	0.40	0.50	0.72	0.97	0.78	0.88
5	0.38	0.63	0.79	0.77	1.26	0.91
6	0.35	0.66	0.63	0.91	0.78	1.48
7	0.36	0.50	0.72	0.70	1.06	1.92
8	0.33	0.60	0.83	0.86	0.78	2.15

(15 marks)

Q4 (a) Give **3 (THREE)** characteristics of stage gauge staff.

(6 marks)

(b) List **4 (FOUR)** methods of streamflow determination.

(4 marks)

(c)   Data of stream-gauging at a gauging site are given in **Table Q4(c)**. The rating equation of the current meter is $v = 0.55 N_s + 0.05$ m/s. Calculate the discharge in the stream.

Table Q4(c) : Data of stream-gauging

Distance from left of bank (m)	0	3	6	9	12	15	18	21
Depth (m)	0	1.4	3.1	6.2	6.3	3.0	1.3	0
Revolutions at 0.6d	0	44	66	122	124	64	42	0
Duration of observation (s)	120	120	120	120	120	120	120	120

(15 marks)

Q5   (a)   What are hydrograph components.

(4 marks)

(b)   Why we need Unit Hydrograph (UH).

(6 marks)

(c)   Refer **Table Q5(c)**, the daily streamflow data for a particular catchment having an area of 7000 km^2. Separate the baseflow using the intersection method ($N = 0.8A^{0.2}$). Determine total of baseflow and direct flow method.

Table Q5(c) : Daily streamflow data

Time (days)	1	2	3	4	5	6	7	8	9	10
Total Flow (m^3/s)	500	650	800	1100	1200	900	800	600	550	550

(15 marks)

Q6   (a)   What is the meaning of flood routing.

(3marks)

(b)   Explain briefly the functions of hydrologic routing.

(6 marks)

(c)   Route the inflow hydrograph tabulated in the **Table Q6(c)** which x = 0.2 and K = 20 hours where the inflow equals to outflow for the first day.

Table Q6(c) : Inflow hydrograph

Time (hour)	12	24	36	48	60
Inflow (ft^3/s)	100	250	500	300	150

(16 marks)

FINAL EXAMINATION

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EQUATIONS

$$\Delta Q_1 = y_i\left(\frac{W_i}{2} + \frac{W_{i+1}}{2}\right)v_i$$

$$O_2 = C_o I_2 + C_1 I_1 + C_2 O_1$$

$$\overline{W}_1 = \frac{\left[W_1 + \frac{W_2}{2}\right]^2}{2W_1}$$

$$C_o = \frac{0.5\Delta t - Kx}{K(1-x) + 0.5\Delta t}$$

$$\overline{W}_N = \frac{\left[W_N + \frac{W_{N-1}}{2}\right]^2}{2W_N}$$

$$C_1 = \frac{0.5\Delta t + Kx}{K(1-x) + 0.5\Delta t}$$

$$S_2 = S_1 + \Delta t\left[\frac{I_1 + I_2}{2} - \frac{O_1 + O_2}{2}\right]$$

$$C_2 = \frac{K(1-x) - 0.5\Delta t}{K(1-x) + 0.5\Delta t}$$

$$T = \frac{n+1}{m}$$