國立成功大學
111學年度碩士班招生考試試題

編　號： 105

系　所： 水利及海洋工程學系

科　目： 水文學

日　期： 0220

節　次： 第 3 節

備　註： 可使用計算機

※ 考生請注意：本試題可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

(1) Please explain following terms

　　(a) Albedo (4 points)

　　(b) Direct Runoff (4 points)

　　(c) Instantaneous Unit Hydrograph (4 points)

　　(d) Linear Reservoir (4 points)

　　(e) Hydrologic Frequency Analysis (4 points)

(2) The SCS curve number method uses the following equation to determine direct runoff:

$$Q = \frac{(P-0.2S)^2}{P+0.8S} \quad \text{where} \quad S = \frac{1000}{CN} - 10$$

　　(a) Please explain the meanings of S and CN (10 points)

　　(b) Compute the direct runoff from 10 inches of rainfall on a 100 acre watershed, in which 50% are

　　　　residential areas with CN=90 and 50% are pasture land with CN=60 (10 points)

(3) The figure below shows the unconfined ground water flow between two reservoirs. Please derive that

　　the water table can be simplified by the Dupuit Parabola: $h(x)^2 = h_0^2 + \frac{x(h_L^2 - h_0^2)}{L}$ using Darcy's law.

　　(20 points)
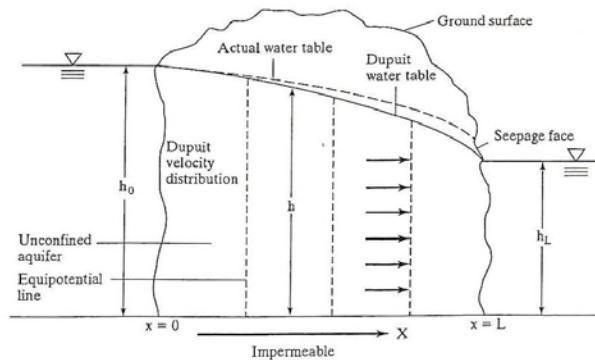
(4) For channel routing, the following equation is commonly used to relate the inflow and outflow at sequent time steps:

$$Q_{j+1} = C_1 I_{j+1} + C_2 I_j + C_3 Q_j$$

where I_j and Q_j are inflow and outflow at time j, respectively; I_{j+1} and Q_{j+1} are inflow and outflow at time $j+1$, respectively.

(a) Please determine the coefficients for C_1, C_2, and C_3 using continuity equation $I - Q = S/\Delta t$ and storage function $S = KQ$ (10 points)

(b) With K=12 hr and X=0.1, please calculate the outflow hydrograph for a river with the following inflow hydrograph using the results obtained above (10 points)

T (hr)	6	12	18	24	30	36	42	48	54	60	66
Inflow (cms)	40	90	170	280	210	150	120	95	75	55	40

(5) The following table shows the annual rainfall data from a rainfall station.

T (yr)	1	2	3	4	5	6	7	8	9	10
R (mm)	40	30	30	60	50	40	40	30	30	50

(a) Calculate the sample mean and the sample standard deviation (10 points)

(b) Please use EV1 to determine the rainfall for 10 year return period. The frequency factor K for EV1 distribution is : (10 points)

$$K = -\frac{\sqrt{6}}{\pi}\left\{0.5772 + ln\left[ln\left(\frac{T}{T-1}\right)\right]\right\}$$