編號： 107

國立成功大學 109 學年度碩士班招生考試試題

系　　所：水利及海洋工程學系

考試科目：水文學

考試日期：0210，節次：3

※ 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 the following terms:
   (1) Dew point (4%)
   (2) Precipitable water (4%)
   (3) Time of concentration (4%)
   (4) Wilting point (4%)
   (5) Interception (4%)

2. A watershed encloses an area of 35 km^2. On January 10th, a short-duration sever rainfall event occurred, and the rainfall data were recorded in the following table. The volume of direct runoff was measured as 1.4×10^6 m^3. Please calculate the average infiltration rate. (20%)

Time	January 10th 12:00—14:00	January 10th 14:00—16:00	January 10th 16:00—18:00	January 10th 18:00—20:00
Rainfall (mm/hr)	12	20	15	4

3. The Horner rainfall intensity formula for return period of 200 years in Cheng-Da catchment is formulated as $i = 200/(t+10)^{0.5}$, where i is rainfall intensity (mm/hr) and t is rainfall duration (min). Please use the alternating block method to derive the design rainfall hyetograph for Cheng-Da catchment. The duration of the design rainfall event is set as 6 hours, and the time interval is 1 hour. (20%)

4. The upstream inflow of a river reach is listed in the following table. Please use Muskingum method to calculate the downstream outflow. The weighting factor X is 0.14, and the storage coefficient K is 6 hours. The initial outflow can be set the same as the initial inflow. The following equations can be useful for the calculation of Muskingum method. (20%)

Time (hour)	0	3	6	9	12	15
Discharge (m^3/s)	10	20	50	30	10	2

$$C_0 = \frac{-KX + 0.5\Delta t}{K - KX + 0.5\Delta t} \qquad C_1 = \frac{KX + 0.5\Delta t}{K - KX + 0.5\Delta t}$$

5. The annual maximum discharge data at a certain site for 30 years are recorded. The average of the annual maximum discharge is 300 m^3/s, and the standard deviation is 100 m^3/s. The annual maximum discharge data follow the extreme value type I distribution according to the Chi-square test. The frequency factor K of the extreme value type I distribution is a function of the return period T and is formulated as below. Please estimate the probability that the flood discharge exceeds 500 m^3/s during the next 5-year period. (20%)

$$K = -\left[0.45 + 0.7797 \times \ln\left(\ln\frac{T}{T-1}\right)\right]$$