編號： 110

國立成功大學 105 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：0227，節次：3

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

1. Please use ">", "<" or "=" to compare the following factors and briefly explain your reasons.
   (a). Same area, same storm event, direct runoff from a larger hydraulic conductivity soil ___ direct runoff from a smaller hydraulic conductivity soil. (2%)
   (b). Same soil, the capillary suction head of drying process ___ the capillary suction head of wetting process. (2%)
   (c). In the same watershed, duration of the 2 hour unit hydrograph ___ duration of the 3 hour unit hydrograph. (2%)

2. Short answers (please explain what they are):
   (a). Flow duration curve. (4 %)
   (b). Double-mass curve. (4 %)
   (c). Depth-area-duration curve. (4 %)

3. Please explain how to estimate the 100-year event from 20 years hourly precipitation data. (10 %)

4. The Muskingum river routing equation, $O_{j+1} = C_1 I_{j+1} + C_2 I_j + C_3 O_j$. Please derive the equation based on the assumption [$S = aI + bO$; S is the total channel storage] by giving C_1, C_2, C_3. (10 %)

5. Assume the annual maximum streamflow of a station is log-normal distribution. The median of the streamflow data series is 1000 cms. The standard deviation of the log streamflow data is 1.25. If the levee near this gauge station is designed for 10000 cms. Please calculate the probability of getting flood twice in this area in 5 years? (10 %)

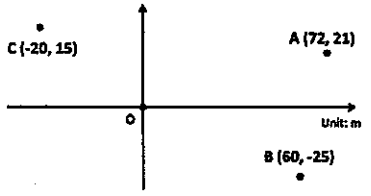
6. After a storm event, Taiker decided to check the streamflow data from Water Resources Agency website (Shown below). Assume the baseflow remained 10 m^3/s during the recorded period and the Φ-index is 1 cm/hr. The depth of the rainfall was 4 cm in the first 2 hours and 6 cm in the next 2 hours.

Time (h)	0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
Streamflow (m^3/s)	10	25	85	145	175	220	295	355	385	385	280	160	100	40	10

   (a). What is the watershed area? (6 %)
   (b). Taiker wanted to use this hydrograph as inflow to practice the Muskingum Method. The initial outflow is 10 m^3/s. Determine the outflow of 1.5th hour from this reach if K = 0.5 hr, X = 0.25 (8 %)
   (c). In the same watershed, determine the new streamflow hydrograph after 3 cm/hr in the first 1.5 hours and 2 cm/hr in the next hour? Assuming loss and the baseflow remain the same. (16 %)

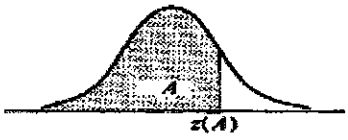
7. The locations of the three exactly the same pumping wells (A, B, and C) are shown in below figure. After 5 hours pumping (Q=0.02 cms), the drawdown curve of each well is shown in below table, what is the actual drawdown at point O? (10%)

Distance (m)	20	30	40	50	60	70	80	90	100	150
Drawdown (m)	1.1	0.95	0.87	0.75	0.67	0.55	0.50	0.45	0.41	0.24



8. The Water Resources Agency has recently finished a pilot project to use the water in the hyporheic zone (伏流水), Please briefly introduce the project and define what the water (伏流水) is. Please also list the pros and cons of using this water. (12 %)

Entry is area A under the standard normal curve from $-\infty$ to $z(A)$



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936