

國立中央大學 資訊工程學系
九十四學年度 碩士在職專班 招生入學考試命題紙

科目： 數 位 設 計

第一頁 共 一 頁

1. Simplify the Boolean function $F(W, X, Y, Z) = \sum m(0, 1, 2, 4, 5, 6, 8, 9, 12, 13, 14)$. (10%)
2. Determine the prime implicants and essential prime implicants of the following Boolean function: $F = w'y + xyz + wy'z' + wz$. (10%)
3. A logic circuit implements the following Boolean function: $F = A'C + AC'D'$. It is found that the circuit combination $A = C = 1$ can never occur. Find a simpler expression for F using the proper don't-care conditions. (10%)
4. Design a 4-to-16 decoder, using 2-to-4 decoders. (10%)
5. For arbitrary Boolean functions, compare the cost and delay of their implementations with: a PROM, a PLA, and a random logic. (15%)
6. Implement JK flip-flops using only AND, OR, and inverter gates, and D flip-flop. (10%)
7. Construct a 4-bit asynchronous counter using T flip-flops. (15%)
8. Design a counter that counts in the following sequence 0, 1, 2, 4, 8, 0, ... using D flip-flops. (20%)