

## 國立台灣科技大學九十六學年度碩博士在職專班招生試題

系所組別：資訊工程系碩士在職專班、高職教師組

科目：資訊工程概論

總分 100 分

1. (10%) Is the logical expression  $(p \wedge \neg q) \vee (\neg p \vee q)$  a tautology or not? Prove your answer.

2. (10%) Given three sets  $A_1$ ,  $A_2$  and  $A_3$ , show that  $|A_1 \cup A_2 \cup A_3| = |A_1| + |A_2| + |A_3| - |A_1 \cap A_2| - |A_1 \cap A_3| - |A_2 \cap A_3| + |A_1 \cap A_2 \cap A_3|$  where  $|S|$  denotes the number of elements of set S.

3. (15%) Please solve the recurrence

$$T_n = 6T_{n-1} - 8T_{n-2}, \quad 2 \leq n \leq \infty$$

with  $T_0 = 3$  和  $T_1 = 4$ .

4. (15%) Show that the number of faces (or regions) in the simple planar graph is at most  $2|V| - 4$  where V denotes the set of vertices in the graph. (Hint: Using Euler Formula and deriving inequalities)

