

# 國立交通大學試題紙

九十五學年度第二次  
博士班資格考

科目：計算理論 (B)

日期：96 年 7 月 26 日 第 1 頁 共 1 頁

請 “✓” 明    ✓不可看書    可看書

\* 請將答案依題號順序寫入答冊

1. (15%) Let  $L = \{ \langle M_1, M_2, w \rangle \mid M_1 \text{ and } M_2 \text{ are TM's with } L(M_1) \neq \emptyset, \text{ either } w \notin L(M_1) \text{ or } w \notin L(M_2) \}$ . Is  $L$  recursively enumerable? Prove your answer.
2. (15%) For each Turing machine  $M$ , define  $f_M(w) = 1$  if and only if  $w \in L(M)$ . Is the set  $F = \{f_M \mid M \text{ is a Turing machine that halts on all inputs.}\}$  of functions countable? Prove your answer.
3. (5%) Draw a transition diagram of a Turing machine that computes the function  $f(0^i) = 0^{\lfloor i/3 \rfloor}$  for  $i \geq 0$ .
4. (15%) Consider the clique problem: given an undirected graph  $G = (V, E)$  and a positive integer  $k$ , determine whether  $G$  contains a complete subgraph of  $k$  or more nodes. Show that this problem is NP-complete by reducing from the SAT problem. Specify your reduction formally and prove its correctness.