

# 國立臺北科技大學九十八學年度碩士班招生考試

系所組別：2150 電機工程系碩士班戊組

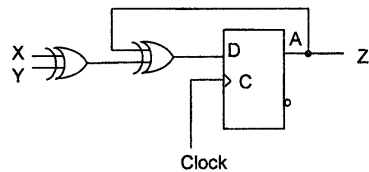
## 第一節 計算機概論 試題

第一頁 共二頁

### 注意事項：

1. 本試題共 10 題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

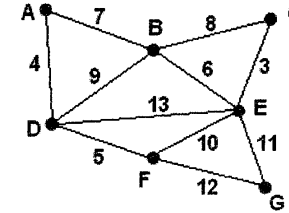
- 一、1. List the following classes in decreasing order of efficiency. (5%)  
 $\Theta(n)$   $\Theta(\lg n)$   $\Theta(n^2)$   $\Theta(n \lg n)$   $\Theta(n^3)$   $\Theta(2^n)$
2. Is a polynomial solution to a problem always better than an exponential solution? Explain your answer. (5%)
- 二、One way of classifying approaches to computer learning is by the level of human intervention required. At the first level is learning by imitation while at the next level is learning by supervised training.
1. In what sense is learning by imitation similar to learning by supervised training? (5%)
  2. In what sense is learning by imitation different from learning by supervised training? (5%)
- 三、Derive the state table and state diagram for the following logic diagram. (10%)



- 四、1. Summarize the principles of public-key encryption. (5%)
2. In what manner can we use public key and private key to produce a digital signature and decrypt it? (5%)

五、Kruskal's algorithm is an algorithm in graph theory that finds a minimum spanning tree (MST) for a connected weighted graph.

1. For the graph as shown below, use Kruskal's algorithm to generate a minimum spanning tree, show the MST generated. (5%)
2. Why Kruskal's algorithm is classified as a greedy algorithm? (5%)



六、Client/server model and peer-to-peer (P2P) model are used extensively in network application. Explain the difference between these two models in terms of the method of process communication and the execution time of processes. (10%)

七、In an object-oriented programming environment,

1. What is the difference between a user-defined data type and a primitive data type? (5%)
2. What is the difference between an abstract data type and a user-defined data type? (5%)

八、1. Apply the following procedure to the value 5, in which  $N$  is an integer, and record the values that are printed. (5%)

**procedure** MysteryDigit ( $N$ )

**if** ( $N > 0$ ) **then** (print the value of  $N$  and

    apply the procedure MysteryDigit to the value  $N - 2$ )

**print** the value of  $N + 1$

2. Rewrite the procedure MysteryDigit given above into a complete function using C or C++ language. (5%)

九、Hashing is a technique that provides quick access to entries within a data storage structure without expense of index maintenance. If a hash file is partitioned into 10 buckets, what is the probability of at least two of three arbitrary records hashing to the same bucket? (Assume the hash function gives no bucket priority over the others.) How many records must be stored in the file until it is more likely for collisions to occur than not? (10%)

注意：背面尚有試題

十、 A machine has 16 general-purpose registers 0 through  $F_{16}$ . Each register is one byte long. There are  $256_{10}$  cells in the machine's main memory, the address of each cell is in the range of 0 to 255. Each machine instruction is two bytes long. The first 4 bits provide the op-code; the last 12 bits make up the operand field. The steps in the machine cycle are fetch, decode, and execute. Each fetch process retrieves the contents of two memory cells. The table that follows lists part of the instructions in hexadecimal notation together with a short description of each. The letter  $R$  is used in place of hexadecimal digits in those fields representing a register identifier that varies depending on the particular application of the instruction. The letters  $XY$  represent a memory address or an immediate value.

Op-code	Operand	Description
1	$RXY$	Load the register $R$ with the bit pattern found in the memory cell whose address is $XY$ .
2	$RXY$	LOAD the register $R$ with the bit pattern $XY$ . (Example: 243A load value 3A to register 4.)
3	$RXY$	Store the bit pattern found in register $R$ to the memory cell whose address is $XY$ . (Example: 302B store the contents of register 0 to the memory cell whose address is 2B.)
4	...	
C	000	Halt execution.

Suppose the memory cells at address 00 through 05 in the machine described above contain the following patterns.

Address	Contents
00	21
01	04
02	31
03	00
04	C0
05	00

Assuming that the program counter (PC) initially contains 00, and the program counter is updated during fetch phase. Show the contents of the program counter, instruction register (IR), and memory cell at address 00 at the end of each fetch phase of the machine cycle until the machine halts. (10%)

(Note: PC and IR are one byte and two bytes long, respectively)