國立台灣科技大學九十九學年度碩士班招生試題

系所組別：　電機工程系碩士班戊組

科　　目：　計算機概論

（總分為100分）

1. What is the average access time for a hard disk spinning at 100 revolutions per second with a seek time of 10 milliseconds? Explain your answer. (10%)

2. The following table represents the addresses and contents (using hexadecimal notation) of some cells in a machine's main memory. Starting with this memory arrangement, follow the sequence of instructions and record the final contents of each of these memory cells: (10%)

address	contents
00	AB
01	53
02	D6
03	02

   Step 1: move the contents of the cell whose address is 03 to the cell at address 00.
   Step 2: move the value 01 into the cell at address 02
   Step 3: move the value stored at address 01 into the cell at address 03
   Step 4: move the value stored at address 02 into the cell at address 00

3. The following program segment is designed to compute the product of two nonnegative integers X and Y by accumulating the sum of X copies of Y; that is, 3 times 4 is computed by accumulating the sum of three 4s. Is the program segment correct? Explain your answer. (10%)

   product ← 0;
   count ← 0
   repeat (product ← product + Y)
          count ← count + 1)
   until (count = X)

4. Suppose you want to isolate the middle three bits of a seven-bit string by placing 0s in the leftmost 2 bits and 1s in the rightmost 2 bits without disturbing the middle three bits. What masks must you use together with what 2 operations? (10%)

5. Describe the bootstrap process in a computer. (10%)

6. Explain the time complexity for each of the following sorting methods: (15%)
   (a) Insert sort
   (b) Quick sort
   (c) Merge sort
   (d) Heap sort
   (e) Selection sort

7. Read a serial of numbers of 71, 48, 33, 11, 78, 51, 63, 18, 25, 9 in sequence to find:
   (a) Max heap tree. (10%)
   (b) Binary search tree. (10%)

8. A *B-tree of order n* is a balanced order-*n* multiway search tree in which each nonroot node contains at least (n-1)/2 keys. The following figure shows a subtree of a B-tree of order 5. Give the subtrees after inserting 380, 530, and 510, respectively. (15%)