

# 淡江大學 103 學年度碩士班招生考試試題

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系別：資訊工程學系  
資訊工程學系資訊網路與通訊碩士班

科目：作業系統

考試日期：3月2日(星期日) 第2節

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本試題雙面印刷

1. (a) List the three conditions that must be satisfied to solve the **critical-section problem**. (10%)  
(b) Show that which condition(s) cannot be satisfied by the following code segment in the concurrent programming environment,

```
do {  
    while (TestAndSet(&lock));  
    // critical section  
    lock = FALSE;  
    // remainder section  
} while (TRUE);
```

where `lock` is a shared boolean variable (initialized to `FALSE`) and `TestAndSet()` is an atomic hardware instruction (which will set the input parameter to `TRUE` and return the original value of the input parameter). (10%)

2. What will be the possible value of the variable `x` (shared by Threads 1 and 2) in the following code segment after the program is executed. (Assume that the initial value of `x` is 0.) Why? (10%)

```
Thread 1: { for (i = 0; i < 15; i++) x = x + 1; }  
Thread 2: { for (i = 0; i < 15; i++) x = x - 1; }
```

3. What are the differences between **preemptive** and **non-preemptive** scheduling? (10%)
4. Suppose that a disk drive has 1,000 cylinders, numbered 0 to 999. The drive is currently serving a request at cylinder 593, and the previous request was at cylinder 425. The queue of pending requests, in FIFO order, is

296, 470, 693, 774, 948, 509, 122, 750, 30

Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for each of the following disk-scheduling algorithms? (20%)

(a) SSTF, (b) LOOK.

5. Consider a two-dimensional integer array `A` (where an integer is 4-byte long):

```
int A[][] = new int[50][50];
```

where `A[0][0]` is stored at location 1024, in a paged memory system with pages of size 1024 bytes. A small process resides in page 0 (locations 0 to 1023) for manipulating the matrix `A`. Thus, every instruction fetch will be from page 0. For a process with four page frames, how

