

國立高雄第一科技大學 100 學年度 碩士班 招生考試 試題紙

系所別：電腦與通訊工程系

組別：電腦組

考科代碼：2214

考科：計算機概論

注意事項：

- 1、本科目應使用符合考選部公告核定之國家考試電子計算器。
- 2、請於答案卷上規定之範圍作答，違者該題不予計分。

1. Answer the following questions about CPU-scheduling algorithms.

- (1) A CPU-scheduling algorithm determines an order for the execution of its scheduled processes. Given n processes to be scheduled on one processor, how many different schedules are possible? Give a formula in terms of n . (5%)
- (2) Consider the following set of processes, with the length of the CPU-burst time given in milliseconds:

<u>Process ID</u>	<u>Burst Time</u>	<u>Arrival Time</u>
P_1	5	0
P_2	2	2
P_3	6	4
P_4	4	6
P_5	3	8

- ① What is the average turnaround time for these processes with the shortest-job-first (SJF) scheduling algorithm? (5%)
 - ② What is the waiting time of each process for the round-robin (RR) scheduling algorithm with time slice 3? (5%)
 - ③ The performance of the round-robin (RR) scheduling algorithm depends heavily on the size of the time slice. Explain why? Should we shorten the time slice as much as possible? (5%)
2. Suppose that a disk drive has 200 cylinders, numbered 0 to 199. The drive is currently serving a request at cylinder 53, and the previous request was at cylinder 125. The queue of pending requests, in FIFO order, is
- 98, 183, 37, 122, 14, 124, 65, 67.
- 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 diskscheduling algorithms?
- (1) FCFS (5%)
 - (2) SCAN (5%)

3. What is the cause of thrashing? How does the system detect thrashing? Once it detects thrashing, what can the system do to eliminate this problem? (10%)

4. Consider the following snapshot of a system:

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P_1	5	6	0	3	7	6	5	3	1	5	2	0
P_2	1	3	2	1	6	4	8	1				
P_3	5	1	1	0	5	2	2	1				
P_4	0	4	3	2	1	8	5	2				
P_5	2	0	1	0	4	5	1	3				

Answer the following questions using the banker's algorithm:

- (1) Is the system in a safe state? Why or why not? (5%)
- (2) If a request from process P_2 arrives for (0, 1, 1, 0), can the request be granted immediately? Explain your answer. (5%)

5. Answer the following questions about the big-Oh notation.

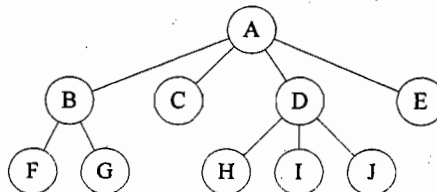
- (1) Show that the following equality is incorrect: (5%)

$$10n^2 + 9 = O(n)$$

- (2) For the following program fragment, give an analysis of the running time (using the big-Oh notation). (5%)

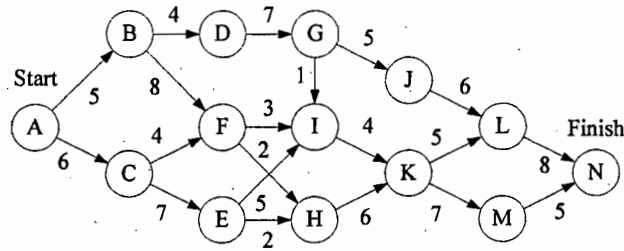
```
int fibon(int n){
    int ans;
    if(n == 0 || n == 1)
        ans=n;
    else
        ans=fibon(n-1)+fibon(n-2);
    return ans;
}
```

6. Consider the following general tree T :



- (1) What are the differences between a general tree and a binary tree? Detail your answer(s). (5%)
- (2) Give the binary tree T_b corresponding to T . (5%)
- (3) Represent T_b with a generalized list. (5%)

7. Suppose you are given the following ten numbers: 26, 5, 77, 1, 61, 11, 59, 15, 48, and 19.
- (1) Please sort these numbers in increasing order using the quicksort algorithm. Show the actions step by step. (5%)
 - (2) Is quicksort a stable sorting algorithm? Justify your answer. (5%)
 - (3) Explain why quicksort is $O(n^2)$ in its worst case, and $O(n \log n)$ in average. (5%)
8. Consider a project P represented by the following AOE (activity on edge) network:



- (1) List the events of P in topological order. (5%)
- (2) Which activities are critical? (5%)