

長庚大學103學年度第二學期 電機系博士班資工領域資格考試
科目：作業系統

- For the thrashing in operating systems, please answer the following questions:
 - What is the cause of thrashing? **(5 pts)**
 - How does an operating system detect thrashing? **(5 pts)**
 - Once the system detects thrashing, what can the system do to eliminate this problem? **(5 pts)**
- Please define (1) I/O-bound processes **(5 pts)** and (2) CPU-bound processes. **(5 pts)**
- Please (1) define “Race Condition” **(10 pts)** and (2) provide an example for Race Condition. You can use the case, counter ++ and counter -- are in two different processes, as the example. **(5 pts)** (Hint: the assembly code of counter ++ could be: $r_1 = \text{counter}$; $r_1 = r_1 + 1$; $\text{counter} = r_1$;))
- Consider the following processes, assume that the time unit is one millisecond.,
 - Draw the scheduling charts for FCFS (first come first serve) scheduling, SJF (short job first) scheduling and RR (round robin) scheduling. (time slice=1 ms) **(9 pts)**
 - Derive the average waiting time of each scheduling algorithm. **(6 pts)**

<u>Process</u>	<u>Burst Time (ms)</u>	<u>Ready Time (ms)</u>
P ₁	10	0
P ₂	1	0
P ₃	2	0
P ₄	3	3
P ₅	5	4
- Explain the difference between a process and a thread. Please also describe the advantage of multi-threading compared to multi-process programming. **(10 pts)**

6. For the memory management in operating systems, please explain the following terminology:
- (1) Logical address **(5 pts)**
 - (2) Physical address **(5 pts)**
 - (3) External fragmentation **(5 pts)**
 - (4) Internal fragmentation **(5 pts)**

7. This question is to evaluate your knowledge of memory paging. For a system with a page table and a TLB, as shown in the following figure, please (1) define what is TLB. **(5 pts)** (2) Please explain the meaning (not just the terms) of the numbers p, d and f in the figure. **(10 pts)**

