考試科目	作業系統	所別	資訊科學系	考試時間	3月14日 星期六 第 二 節

可用中文或英文作答

There are **11** problems for this examination and the weights for each (sub)problem is indicated.

1. Please answer the following question:
   a. (5%) What is ***context switch***?
   b. (5%) What are the necessary conditions for the happening of a ***deadlock***?
2. (10%) Please draw the ***Diagram of Process State Transition*** and write in the diagram the name of a transition. Explain the reasons why a transition occurs.
3. Please answer the following question:
   a. (5%) What is ***thrashing***?
   b. (5%) How to prevent it?
4. Please answer the following question:
   a. (4%) What is the purpose of ***system call***?
   b. (6%) What are three general methods used to pass parameters to the operating system in the system calls during different circumstance?
5. Given a reference string: 4, 3, 2, 1, 4, 3, 5, 4, 2, 1.
   a. (5%) How many page faults will occur using FIFO page-replacement algorithm? For 4 page frame.
   b. (5%) How many page faults will occur using LRU (Least Recently Used) page-replacement algorithm? For 4 page frame.

備考	試題隨卷繳交
命題委員：	（簽章）

命題紙使用說明：1. 試題將用原件印製，敬請使用黑色墨水正楷書寫或打字（紅色不能製版請勿使用）。
2. 書寫時請勿超出格外，以免印製不清。

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6. Please answer the following question:

   a. (5%) Why we have to guard against race condition and synchronize the ***critical section***?

   b. (5%) Please justify whether the following two concurrent serializable transaction T_0 and T_1, schedule ***S*** can be transformed into a serial schedule ***S'***

T_0	T_1
read(A)	
write(A)	
	read(B)
	write(B)
read(B)	
write(B)	
	read(B)
	write(B)

7. Consider a ***multi-level feedback queue*** in a single-CPU system. The first level (queue 0) is given a quantum of 8 ms, the second one a quantum of 16 ms, the third is scheduled FCFS. Assume six jobs (J1 ~ J6) arrive all at time zero with the following job times (in ms): 4, 7, 12, 15, 25 and 30.

   a. (4%) Show the ***Gantt chart*** for this system.

   b. (3%) Compute the ***turnaround time.***

   c. (3%) Compute the ***response time.***

8. (5%) Which of the following algorithms are preemptive scheduling?

   a. First-in-first-out

   b. Round-robin

   c. Shortest-job-first

   d. Multilevel Feedback Queue Scheduling

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9. Please answer the following question about memory management:
   a. (3%) Consider a two-level page table scheme, in which the outer page table itself is also paged with the page table store in memory. If a memory reference takes 90 nanoseconds, how long does a paged memory reference take?
   b. (2%) If we add TLBs, and 95 percent of all page-table references are found in the TLBs, what is the effective memory reference time? (Assume that finding a page-table entry in the TLBs take 9 nanoseconds, if the entry is there)

10. Please answer the following question:
   a. (5%) What is ***starvation***?
   b. (3%) Among the FCFS(first-come-first-serve), SSTF(shortest-seek-time-next), LOOK, SCAN, C-LOOK, C-SCAN, and N-Step SCAN disk-head scheduling policies, which are subject to starvation at high loads*?*
   c. (2%) Response times are more predictable in preemptive systems than in non-preemptive systems. ***True or False?***

11. Consider the following hardware configuration. Virtual address = 32 bits, page size = 4Kbytes, and a page table entry occupies 4 bytes. How many pages should the OS allocate for the pages tables of a 12Mbyte process under the following paging mechanisms?
   a. (5%) one-level paging.
   b. (5%) two-level paging. (Assuming that the number of entries in a first-level page table is the same as that in a second-level page table)

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