

科目：計算機系統

系所組：資訊工程研究所

Answer all the questions clearly. Each Question is worth 10 pts for a total of 100 pts.

中英文作答均可 ※ 注意： 試題須隨答案卷繳回。

1. a). What is thrashing? What causes it? b). How to prevent thrashing? c). Can we eliminate it from occurring?
2. a). What is demand paging? b). What is lazy Swapper? Explain both in detail for full grade.
3. Consider the reference page sequence is as follows: 1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 4, 5, and the number of page frame is 4? Explain and give details for the following questions below.
  - a. How many page faults would occur using FIFO algorithm?
  - b. How many page faults would occur using LRU algorithm?
  - c. How many page faults would occur using OPT algorithm?
  - d. Suppose we decrease page frame to 3, how many page faults for FIFO algorithm?
  - e. What phenomenon will occur? Explain clearly.
4. a). Can we implement synchronization primitives by disabling interrupts? b). Is it appropriate in a single-processor system if the synchronization primitives are to be used in user-level requirement?
5. Given the following three basic scheduling algorithms such as FCFS, SJF (non-preemptive), and Round Robin,
  - a. Which one is the simplest scheduling algorithm given the above? Explain
  - b. Which one is more appropriate for a time-shared system? Explain
  - c. Which one provides the shortest waiting time? Explain
  - d. Which one will cause short processes to wait for long processes? Explain
  - e. Which one is more likely to be used in OS? Why?
6. For the number of transistors to be quadrupled every 3 years, the line width of VLSI circuits must be reduced by how much in every 3 years?
7. For a MIPS assembly program consists of *beq* and *sw* instructions only, will there be any data hazards when executing the program? Please explain the reasons.
8. Can deeper pipelines of CPUs improve IPC(instructions per clock)? Can more pipelines per core improve IPC(instructions per clock)?
9. What are the advantages of a quad-channel memory controller compared to a single-channel memory controller?
10. When can polled I/O be used instead of interrupt-driven I/O?

※ 注意：1. 考生須在「彌封答案卷」上作答。

2. 本試題紙空白部份可當稿紙使用。

3. 考生於作答時可否使用計算機、法典、字典或其他資料或工具，以簡章之規定為準。