

所別：資訊工程學系碩士班 不分組 科目：作業系統與計算機組織

1. 詳細解釋下列名詞或回答下列問題 (每小題 5 分，合計 30 分)
  - (a) Associative cache organization
  - (b) Nanoprogramming
  - (c) Horizontal and vertical microinstruction
  - (d) Describe the basic idea of Booth's multiplier and write down the conversion table.
  - (e) Two-bit dynamic branch prediction.
  - (f) What is the carry-save adder (CSA)? Give the structure of adding 4 numbers by CSA.
2. Compare the instruction-set architectures in RISC and CISC processors in terms of at least 5 important characteristics. (10%)
3. Explain the basic idea (giving the key points and the reasons) of the two major division algorithms: (a) restoring and (b) nonrestoring divisions. (10%)
4. (6%) Please explain (not just translate) the following terminologies.
  - (a) trashing
  - (b) context switch
5. (12%) Please draw the state diagram of a process. Note that you have to point out the events that trigger the state transition.
6. (12%) Please describe the six-step process in a DMA transfer.
7. (12%) Consider the following set of processes, with the length of the CPU burst time given in milliseconds:

<u>Process</u>	<u>Burst Time</u>	<u>Priority</u>
$P_1$	10	3
$P_2$	1	1
$P_3$	2	3
$P_4$	1	4
$P_5$	5	2

The processes are assumed to have arrived in the order  $P_1, P_2, P_3, P_4, P_5$ , all at time 0. What are the average turnaround times for these processes with the SJF, a nonpreemptive priority (a smaller priority number implies a higher priority), and RR (quantum = 1) scheduling, respectively.

8. (8%) Consider a paging system with the page table stored in memory, where a memory reference takes 100 nanoseconds. If we add associative registers, and 80 percent of all page-table references are found in the associative registers, what is the effective memory reference time? (Assume that finding a page-table entry in the associative registers takes zero time, if the entry is there.)

