

### 計算機結構試題

填准考證號碼

第一頁 共一頁

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#### 注意事項：

1. 本試題共【五】題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在答案卷之答案欄內，否則不予計分。

1. [30%]

Explain the following terms:

- (a) Four-way memory interleaving
- (b) Booth algorithm
- (c) Amdahl's law
- (d) Shared-disk model in Clustering
- (e) Superscalar processing
- (f) VLIW

2. [15%]

- (a) Explain briefly the purpose of cache memory?
- (b) Two different methods of handling the process of returning changed data from cache to main memory are write-through and write-back method. Please explain those methods.
- (c) Assume that the access time of a cache memory is 80ns and that of main memory is 1ms. The hit ratio for read only is 90%. It is estimated that 80% of the memory requests are for read and the remaining 20% for write. A write-through method is used. What is the average access time of the system considering only memory read cycle?

3. [15%]

Consider a paged logical address space (composed of 32 pages of 2Kbytes each) mapped into an 1-Mbyte physical memory space.

- (a) What is the format of the processor's logical address?
- (b) What are the length and width of the page table?
- (c) Explain the best-fit, first-fit, and largest-fit procedures in memory relocation.

4. [20%]

Consider CPU Performance problem. Suppose we have made the following measurements:

- Frequency of FP (floating point) operations (other than FPSQR) =25%
- Average CPI (Clock per Instructions) of FP operations=4.0
- Average CPI of other instructions=1.33
- Frequency of FPSQR=2%
- CPI of FPSQR operations=20

- (a) Calculate the overall CPI ?
- (b) If two design alternatives is proposed as follows.
  - Reduce the CPI of FPSQR to 2
  - Reduce the average CPI of all FP operations to 2Please calculate the new CPI of FP again ?

5. [20%]

- (a) Describe briefly the structural hazards, data hazards, and control hazards problems in pipelined processing.
- (b) Design a pipelined processing for two floating-point addition ( $A+B$ ) with 4 stages, where  $A=a \times 2^p$ ,  $B=b \times 2^q$ .