

國立臺灣科技大學101學年度碩士班招生試題

系所組別：電子工程系碩士班甲組

科目：計算機系統

(總分為100分)

1. (5%) If computer A runs a program in 15 seconds and computer B runs the same program in 25 seconds, how much faster is A than B?
2. (12%) A compiler designer is trying to decide between two code sequences for a particular computer. The hardware designers have supplied the following facts:

	CPI for each instruction class		
	A	B	C
CPI	1	3	4

For a particular high-level language statement, the compiler writer is considering two code sequences that require the following instruction counts:

Code sequence	Instruction counts for each instruction class		
	A	B	C
1	1	2	2
2	3	2	1

- (a) What is CPI? (3%)
 - (b) Which code sequence executes the most instructions? (3%)
 - (c) Which will be faster? (3%)
 - (d) What is the CPI for each sequence? (3%)
3. (9%) Please explain the following terms:
 - (a) What are structural hazards? (3%)
 - (b) What are data hazards? (3%)
 - (c) What are control hazards? (3%)
 4. (5%) Assume that a processor with a 1ns clock cycle time, a miss penalty of 16 clock cycles, a miss rate of 0.07 misses per instruction, and a cache access time (including hit detection) of 1 clock cycle. Note that the read and write miss penalties are the same and ignore other write stalls. What is the average memory access time per instruction?
 5. (9%) Please explain the following terms:
 - (a) What is direct-mapped cache? (3%)
 - (b) What is fully-associative cache? (3%)
 - (c) What is set-associative cache? (3%)
 6. (10%) Explain the relationship of virtual memory, TLB, and caches in detail.



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[資料結構]

7. (20%) Explain the following terms.

- (a) binary search tree (5%)
- (b) hash table (5%)
- (c) recursion (5%)
- (d) time complexity (5%)

8. (10%) Answer the following questions:

- (a) Is heapsort stable? Explain your answer briefly. (5%)
- (b) What kind of data structure you would use for the heap in the heapsort program? Explain your answer briefly. (5%)

9. (10%) Answer the following questions:

- (a) Give an example to illustrate how to represent a graph by an adjacent matrix and by a adjacency list. (5%)
- (b) Discuss the advantages and disadvantages of these two representation methods? (5%)

10. (10%) A degree- n polynomial $p(x)$ is a function of the form $p(x) = \sum_{i=0}^n a_i x^i$, where x is a real number, each a_i is a constant, and $a_n \neq 0$. Describe a linear-time algorithm for computing $p(x)$ for a particular value of x .

