

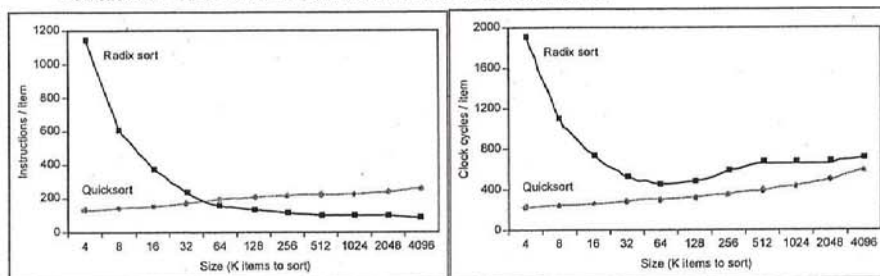
## 國立臺灣科技大學102學年度碩士班招生試題

系所組別：電子工程系碩士班甲組

科目：計算機系統

## [計算機組織]

1. (10%) What is the power wall? How does it affect CPU development?
2. (15%) Please explain the following terms with examples:
  - (a) Structure hazard (5%)
  - (b) Data hazard (5%)
  - (c) Speculation (5%)
3. (5%) Suppose we have a 32-bit virtual address, 4KB pages, and 4 bytes per page table entry. What is the total page size?
4. (10%) Please use CPU execution time formula to explain why superscalar and super pipeline could improve performance.
5. (10%) Please explain why the *clock cycle/item* in the right-hand side is not consistent with *instruction/item* in the left-hand side?



## 國立臺灣科技大學102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)

## [資料結構]

6. [12%] Please explain the following terms

- (a) Hash Function [3%]
- (b) Circularly Linked List [3%]
- (c) Spanning Tree [3%]
- (d) External Sort [3%]

7. [10%] Write the *merge-sort* code. Explain its time complexity.

8. [12%]

- (a) If these keys (8, 3, 15, 7, 20, 11, 9, 2, 19, 1, 16, 14) are inserted to an empty *binary search tree*, what is its tree after insertions? [4%]
- (b) What is its postorder traversal? [4%]
- (c) What is its preorder traversal? [4%]

9. [16%] Describe *the problem of all-pairs shortest paths*? Please write the code to solve the problem.