國立中正大學
109學年度碩士班招生考試
試 題

[第2節]

科目名稱	資料結構
系所組別	電機工程學系-計算機工程組

—作答注意事項—

※作答前請先核對「試題」、「試卷」與「准考證」之系所組別、科目名稱是否相符。

1. 預備鈴響時即可入場，但至考試開始鈴響前，不得翻閱試題，並不得書寫、畫記、作答。
2. 考試開始鈴響時，即可開始作答；考試結束鈴響畢，應即停止作答。
3. 入場後於考試開始40分鐘內不得離場。
4. 全部答題均須在試卷（答案卷）作答區內完成。
5. 試卷作答限用藍色或黑色筆（含鉛筆）書寫。
6. 試題須隨試卷繳還。

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科目名稱：資料結構　　本科目共 1 頁　第 1 頁

系所組別：電機工程學系-計算機工程組

1. Heap

i. (5 points) Draw an example of a heap and define the data structure of a heap using C or pseudo code.

ii. (15 points) Using the data structures above, define the function to construct a heap of an integer array. Be sure to define the function name, parameter list, return value, local variables, and calling method. Use C or pseudo code to complete your answer.

iii. (15 points) Analyze the time complexity of the function above and show the result in the Big-O notation. Be sure to show the steps in analysis and the associated detail calculation.

2. Hashing

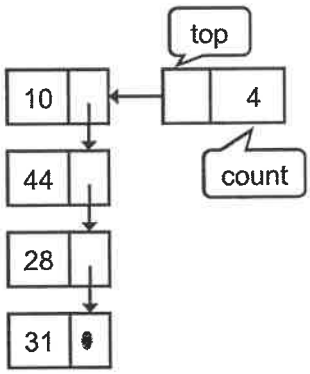
i. (5 points) Consider to store data with integer keys. Draw an example of a hashing procedure and define the data structure to a hash table using C or pseudo code.

ii. (5 points) Design a hash function and a probing function. Use 10 data to show how data are stored to the location calculated by the hash function and how probing function works when a collision occurs.

iii. (10 points) Define the hash function and the probing function. Be sure to define the function name, parameter list, return value, local variables, and calling method. Use C or pseudo code to complete your answer.

iv. (10 points) Analyze the time complexity of the procedure of the hashing procedure using your functions above and show the result in the Big-O notation. Be sure to show the steps in analysis and the associated detail calculation.

3. **Stacks.** Consider the following stack storing integers and answer the following questions.



i. (5 points) Define the data structures needed to represent this stack.

ii. (30 points) Using your data structures, define the functions to NEW, PUSH and POP. The function NEW is to create and initialize a stack. Be sure to define the function name, parameter list, return value, and local variables. Use C or pseudo code to complete your answer. Provide a main function to call these functions in sequence to store and retrieve data.