

# 元智大學 102 學年度研究所 碩士班 招生試題卷

系(所)別： 電機工程學系碩士班      組別： 數位科技組      科目： 資料結構      用紙第 / 頁共 2 頁

Ⓢ 不可使用電子計算機

1. (5%) Compute the time complexity for the problem of **addition** of two matrices. (matrix size:  $n \times n$ )
2. (5%) Compute the time complexity for the problem of **multiplication** of two matrices. (matrix size:  $n \times n$ )
3. (10%) We have the two lists shown below. What would happen if we applied the following statement to these two lists?

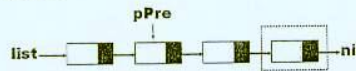


4. (10%) What would be the contents of queue  $Q$  after the following code is executed and the following data are entered? (The data are: 5, 7, 12, 4, 0, 4, 6, 8, 67, 34, 23, 5, 0, 44, 33, 22, 6, 0)

```

Q = createQueue
loop (not end of file)
  read number
  if (number not 0)
    Enqueue (Q, number)
  Else
    x = queuerear (Q, x)
    enqueue (Q, x)
  end if
end loop
    
```

5. (10%) Please list the advantages and disadvantages of two data structures, array and linked list.
6. (10%) Write a pseudo code to insert a new node pNews with data "item" to node enclosing by dotted line.



7. (12%) Draw the expression tree and find the infix and prefix expression for the following postfix expression:

AB\*CD/+EF-\*

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8. (10%) What is the efficiency of the quick sort (4%)? Explain it. (6%)
9. (12%) Describe Huffman code (6%). What is its main advantage (6%)?
10. (16%) Binary tree traversal
- (1) (4%) What is breadth-first-traversal? (draw picture to help understand)
  - (2) (4%) What is depth-first-traversal? (draw picture to help understand)
  - (3) (4%) Can we use recursive algorithm to write bread-first-traversal program? Explain it.
  - (4) (4%) If we want to develop non-recursive algorithms for depth-first-traversal and bread-first-traversal, what data structures will be used? (stack or queue) Explain it.