國立高雄大學九十七學年度研究所碩士班招生考試試題

科目：資料結構
考試時間：100 分鐘

系所：
資訊管理學系碩士班乙組

是否使用計算機：否

本科原始成績：100 分

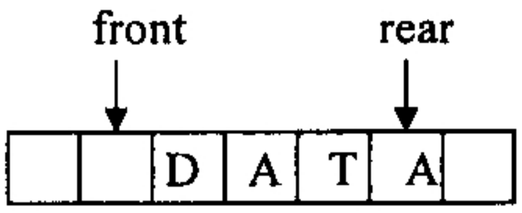
Multiple Choices(選擇題，每題 4 分，共 40 分)

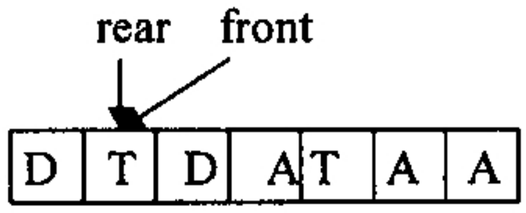
1. Given a 4 x 4 x 4 3-dimensional array, how many elements will be at the same position for row-majoring and column-major arrangements?
   (A) 4 (B) 8 (C) 12 (D) 16

2. What is the *posfix* expression of the following *prefix* expression:
   + ? / abc *d**efg ?
   (A) ab / c ? def *g**+ (B) abc / ? def*g**+
   (C) a / bc ? def*g**+ (D) ab/c ? de*f*g*+

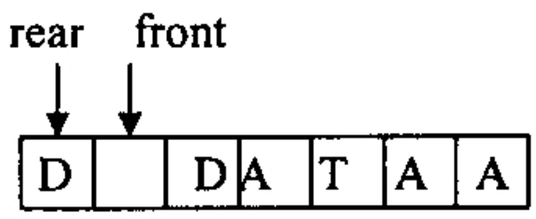
3. Using a stack and operations: *push*, *pop*, *no-op*. Which result can NOT be obtained if we input the following sequence 1, 2, 3, 4, 5, 6 sequentially?
   (A) 324156 (B) 132546 (C) 235146 (D) 325641

4. Given a circular queue as follow, what is the result of inserting A, D, T?

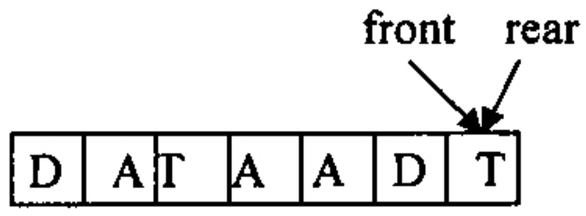


(A) 

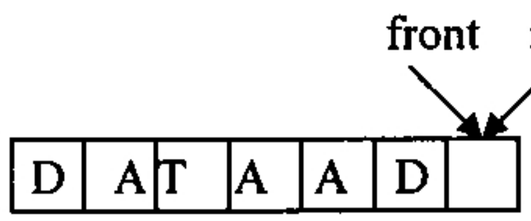
queue full

(B) 

queue full

(C) 

queue full

(D) 

queue full

5. It requires accessing three pointers to *invert* a *singly linked list*. How many pointers are required to *invert* a *doubly linked list*?
   (A) 1 (B) 2 (C) 3 (D) 4

背面尚有試題

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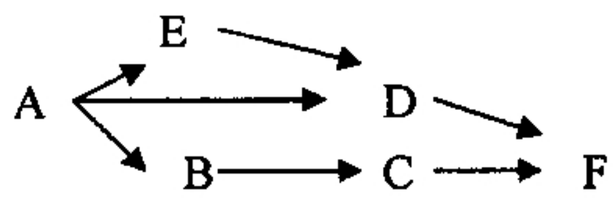
6. Which of the following time complexity is NOT *0(1)* ,
   (A) Insert in unsorted array
   (B) Find Min in balanced tree(red-black tree)
   (C) Member in priority queue using a heap
   (D) Find Min in sorted linked list
7. How many *spanning trees* does a five node complete graph have?
   (A) 120 (B) 60 (C) 48 (D) 24
8. What is the *topological order* of the following directed acyclic graph?



   (A) AEBDCF (B) ABCEDF (C) ABEDCF (D) AEDFBC
9. L_1 and L_2 are 5-element and 4-element sorted lists respectively, what is the minimum number of comparisons required to merge L_1 and L_2 using *merge sort*?
   (A) 1 (B) 4 (C) 5 (D) 6
10. Using *closed hash table* and hash function *h(i) = i MOD 5* with 5 buckets, how many *probes* are required if 13, 28, 35, 4, 20 are inserted sequentially using linear resolution of collision?
   (A) 1 (B) 2 (C) 3 (D) 5

問答題，每題 15 分，共 60 分

11. Write a *recursive* Java or pseudo code to find *the number of nodes with two children*, given a binary tree *t*.
12. The method *contains()* scans an array to determine if the argument `item` is in the list. The method returns true if a match occurs and false otherwise. The following implementation works but is not a good solution.

```
public static boolean contains(int[] arr, int item)
{
    boolean itemFound = false;
    for (int i = 0; i < arr.length; i++)
        if (arr[i] == item)
            itemFound = true;
    return itemFound;
}
```

(a) Create a better implementation of the method.
(b) Use Big O measure of running time to indicate why you have a more efficient solution.

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13. Implement a method, ***bottom()***, that returns the element on the bottom of a nonempty stack.
14. The file "letters.txt? contains the following data: beabdcbacaacbdecdeaaeb
    (a) Construct a Huffman tree for the file.
    (b) Give the bit codes for 'a', 'b', 'c', ? and 'e'.