

國立聯合大學 101 學年度碩士班考試招生

資訊工程系碩士班 入學考試試題科目：計算機概論(含程式設計、資料結構) 第 1 頁共 2 頁

1. (20%) Please give an example to explain the following items.
 (a) Constructor (b) Friend Function (c) Function Overloading (d) Function Template

2. (10%) During execution of the following program segment:

- (a) How many times does the first cout execute?
 (b) How many times does the second cout execute?

```
for (int i = 0; i < 5; i++) {
    for (int j = 0; j < 2*i+1; j++)
        cout << i * j << endl;
    cout << endl;
}
```

3. (10%) What are the values of p and q after execution of those statements fragment?

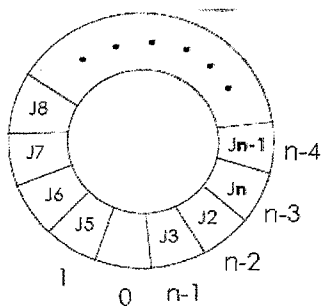
```
i = 3;
j = 9;
m = ++i * --j;
n = i + j--;
p = i + j;
q = m + n;
```

4. (10%) Write a program to call a recurrence function to compute the following equation.

$$f_n = \begin{cases} n & , 0 \leq n \leq 1 \\ f_{n-1} + f_{n-2} & , n \geq 2 \end{cases}$$

5. (10%) (a) Why does a circular queue with size n hold at most n-1 elements? (b) Write an algorithm to add a new integer "item" in the circular queue. The circular queue is implemented by an array queue[] with size n. The specification of the algorithm is as follows.

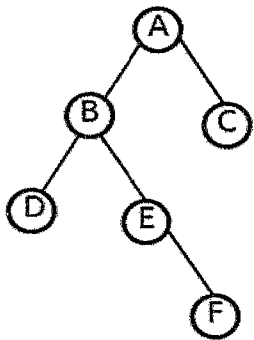
```
void addq(int front, int *rear, int item);
```



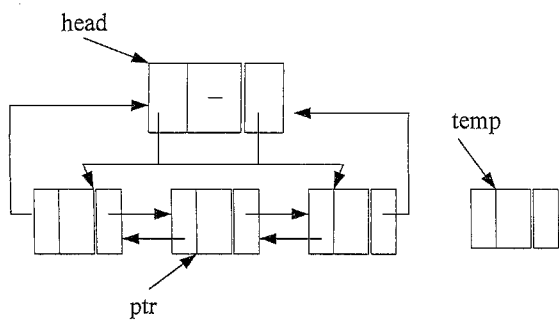
front = 0; rear = n-1

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6. (10%) (a) Write the postorder traversal sequence of the following tree. (b) Redraw the tree in threaded form. (c) Use a stack to calculate the expression represented by the tree. (A = *, B = /, C = 10, D = 8, E = -, F = 4)



7. (10%) (a) Use C/C++ to define the data structure of a node of the following doubly linked list. (b) Write an algorithm to insert node temp to the left of node ptr.



8. (10%) (a) Construct a heap tree (Max heap) from the input data (36, 47, 23, 12, 30). (b) Use heap sort to sort the input data in increasing order. Show how heap sort works on it.

9. (10%) (a) Draw a data structure to represent the following graph by using an array. (b) Use Kruskal algorithm to find a minimum spanning tree for the following graph.

