國立成功大學 107 學年度碩士班招生考試試題

系　　所：工程科學系

考試科目：資料結構

考試日期：0206，節次：1

※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. Translate the expression (a+b+c)*d-e/(f/g-h)*i into postfix form by stack approach. You must show the stack status step by step (10%)

	(	)	+	-	*	/	%	eos
isp	0	19	12	12	13	13	13	0
icp	20	19	12	12	13	13	13	0

Token	Stack	Top	Output

2. The following are the functions for inverting Single Linked Lists and Concatenating two linked lists. Please complete the parts indicated by XXX. (10%)

```
typedef struct list_node *list_pointer;
typedef struct list_node {
    char data;
    list_pointer link;
};

list_pointer invert(list_pointer lead)
{
    list_pointer middle, trail;
    middle = NULL;
    while (lead) {
        trail = middle;
        XXX_1;
        lead = lead->link;
        XXX_2;
    }
    return XXX_3;
```

```
}

list_pointer concatenate(list_pointer ptr1, list_pointer ptr2)
{
  list_pointer temp;
  if (IS_EMPTY(ptr1)) return ptr2;
  else {
    if (!IS_EMPTY(ptr2)) {
      for (temp=ptr1;temp->link;temp=temp->link);
      XXX_4;
    }
    return XXX_5;
  }
}
```

3. Complete the parts indicated by XXX of the Doubly Linked Lists insert function. (10%)

```
typedef struct node *node_pointer;
typedef struct node {
      node_pointer llink;
      element item;
      node_pointer rlink;
}
void dinsert(node_pointer node, node_pointer newnode)
{
      XXX_1 = node;
      XXX_2 = node->rlink;
      XXX_3 = newnode;
      XXX_4 = newnode;
}
```

4. Complete the parts indicated by XXX for the function for inserting a newnode into the front of Circular Linked Lists and caculating the length of linked list . (10%)

```
void insert_front (list_pointer *ptr, list_pointer node)
{
     if (IS_EMPTY(*ptr)) {
          *ptr= node;
          node->link = node;
     }
     else {
           XXX_1;
           XXX_2;
      }
}

int length(list_pointer ptr)
{
     list_pointer temp;
     int count = 0;
     if (ptr) {
          temp = ptr;
          do {
                XXX_3;
                XXX_4;
          } while (temp!=ptr);
     }
     return count;
}
```

5. Please complete the Max Heap Sort algorithm parts indicated by XXX (20%)

```
typedef struct threaded_tree *threaded_pointer;
typedef struct threaded_tree {
     short int left_thread;
     threaded_pointer left_child;
     char data;
```

```
    threaded_pointer right_child;
    short int right_thread;
};

threaded_pointer insucc(threaded_pointer tree)
{
  threaded_pointer temp;
  temp = tree->right_child;
  if (!tree->right_thread)
    while (!temp->left_thread)
      temp = temp->left_child;
  return temp;
}
```

Right Insertion in Threaded BTs

```
void insert_right(threaded_pointer parent, threaded_pointer child)
{
  threaded_pointer temp;
  XXXX_1;
  XXXX_2;
  XXXX_3;
  XXXX_4;
  XXXX_5;
  XXXX_6;
  if (XXXX_7;) {
  temp = insucc(child);
  XXXX_8;
  }
}
```

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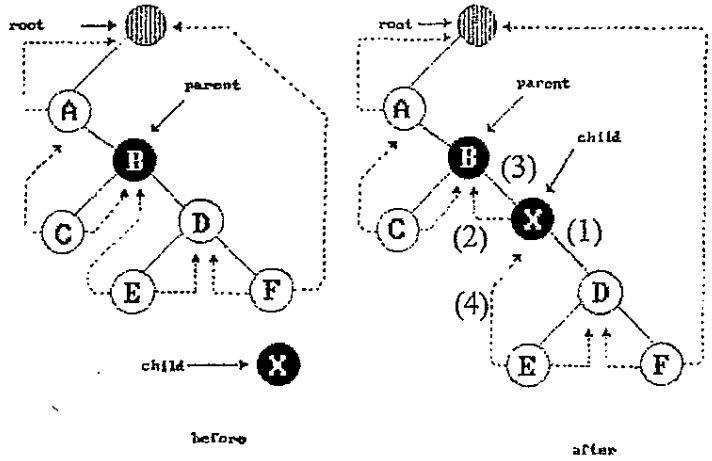
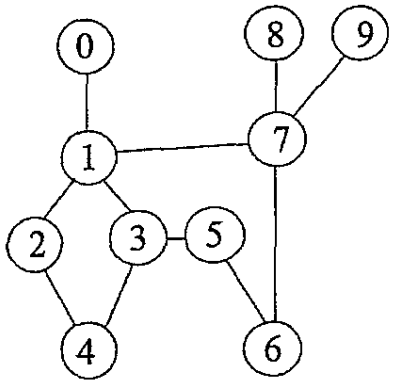


6. Please write down the every sequence of finding biconnected component of a connected undirected graph by depth first spanning tree. (20%)



7. Please find the Minimum Cost Spanning Tree algorithms using Kruskal, Prim and Sollin. (20%)