國立高雄應用科技大學
九十七學年度碩士班招生考試
電子工程系（丙組）

准考證號碼□□□□□□□□□□ （考生必須填寫）

資料結構

試題　　共 3 頁，第 1 頁

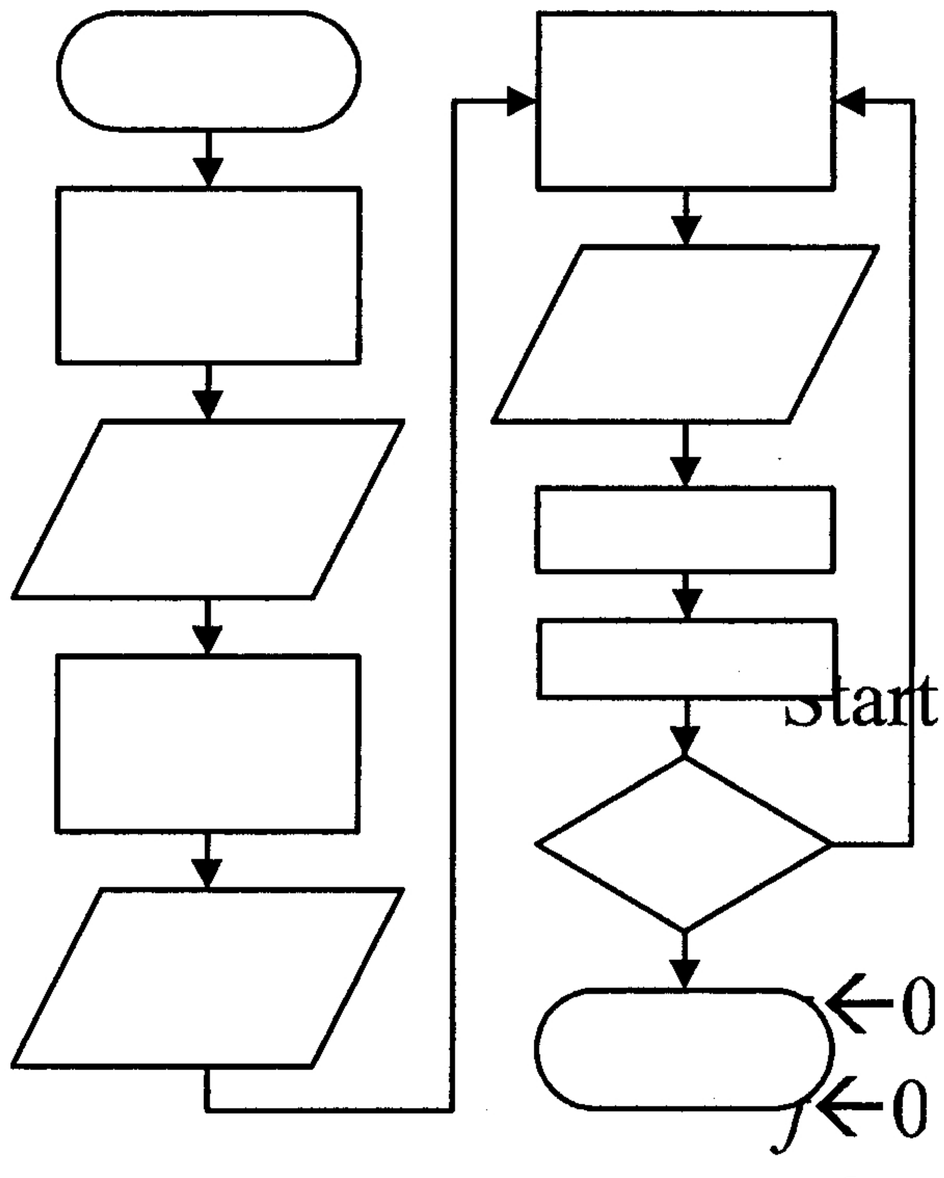
注意：a. 本試題共 6 題，共 100 分。
b. 作答時不必抄題。
c. 考生作答前請詳閱答案卷之考生注意事項。

1. The summation $1+2+3+\cdots+(n-2)+(n-1)+n$ can be evaluated using the following code segments. Please give their computational complexities in *Big-Oh* notation. Note that the reasoning for your answer should be given. (15%)

```
a.   scanf("%d",&n);
     for(sum=0,i=1;i<=n;i=i+1)
         sum=sum+i;
     printf("%d\n",sum);
b.   scanf("%d",&n);
     sum=(1+n)*n/2;
     printf("%d\n",sum);
c.   scanf("%d",&n);
     for(sum=0;i=1;i<=n; i=i+1)
         for(j=1;j<=i;j=j+1)
             sum=sum+1;
     printf("%d\n",sum);
```

2. For a given expression $(a-b)/(c+d)\times e\text{^}f$, where '^' stands for exponential operator, (15%)
   a. Please construct the binary expression tree.
   b. Please give the prefix notation of the expression by pre-order traversal.
   c. Please give the postfix notation of the expression by post-order traversal.

3. Refer to the following flow chart: (15%)



a. Please accomplish the following function table:

n	0	1	2	3	4	5	6	7	8	9	10
f											

b. Please define and implement (in pseudo code) a recursive function for the resulted function table in (a).

4. For a given unordered number list, 5, 2, 8, 6, 1, 4, 9, 3, 7, (15%)
   a. Please construct a binary search tree for the given list, such that in-order traversal will be a sorting for the list in ascending order.
   b. Please delete node 8 from the resulted tree in (a), such that it remains a valid binary search tree.

5. For a given unordered number list, 5, 2, 8, 6, 1, 4, 9, 3, 7, (20%)
   a. Please sort it in ascending order using bubble-sort. Note that the detailed progress of the sorting process should be given in your answer.
   b. Please sort it in ascending order using heap-sort. Note that the detailed progress of the sorting process should be given in your answer.

6. For the following directed graph, (20%)
   a. Find out a topological sorting of the graph. Note that the detailed progress should be given in your answer.
   b. Find out the shortest path from node A to node F using Dijkstra's algorithm. Note that the detailed progress should be given in your answer.