國立嘉義大學 108 學年度

資訊工程學系碩士班招生考試試題

科目：資料結構

1. 請將以下時間複雜度由低至高排列。 (10 分)
   $O(n^3)$, $O(1)$, $O(n^2)$, $O(n \log n)$, $O(\log^2 n)$, $O(2^n)$, $O(n!)$, $O(n^n)$, $O(n)$, $O(\log n)$, $O(\log n^2)$

2. 使用二元搜尋法，在{1,4,7,8,10,11,15}搜尋13是否在其中，搜尋的過程依序會與哪些數字比對？ (10分)

3. 使用以下程式，呼叫ABC(5, 2)函式後，總共會印出幾次 “abc”？ (10分)

```
int ABC (int n, int k) {
if (k == 0 || k == n){
   printf ("abc\n");
   return 1; }
return ABC(n-1,k-1) + ABC(n-1,k);
}
```

4. 以Heap Sort排序十個數字42, 78, 12, 14, 96, 21, 7, 19, 36, 18的第一步是畫出Heap Tree，請畫出包含十個數字的Heap Tree。 (20分)

5. 以下運算式為中序表示法(infix)，請分別列出其前序(prefix)及後序表示法(postfix)。 (20 分)

(a) a * b * c

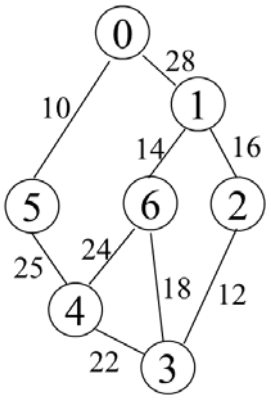
(b) –a + b – c + d

(c) a * -b + c / d

(d) (a + b) * d + e / (f + a * d) + c

6. 請使用 Kruskal 演算法計算出下圖中最小成本生成樹(minimum cost spanning tree)的總成本數。 (10 分)

```
T= {};
while (T contains less than n-1 edges && E is not empty) {
Choose a least cost edge (v,w) from E;
delete (v,w) from E;
if ((v,w) does not create a cycle in T)
       add (v,w) to T
  else discard (v,w);
}
if (T contains fewer than n-1 edges)
   printf(“No spanning tree\n”);
```



7. Suppose that we have the following key values: **7, 13, 44, 86, 5, 33, 6, 2, 45, 2**. (20 分)
   (a) Show the binary search tree ***S*** after each value is sequentially inserted into the binary search tree.
   (b) Is the binary search tree ***S*** a full binary tree?
   (c) Show the binary search tree ***S1*** after inserting 18 into the above binary search tree ***S***.
   (d) Show the binary search tree ***S2*** after deleting 7 from the binary search tree ***S1*** by which we pick up the largest value in the left subtree.