

# 南華大學九十五學年度 碩士在職專班 招生考試試題卷

系所別：資訊管理學系碩士班

科目編號：B2-09-01

科目：資料結構(含演算法)

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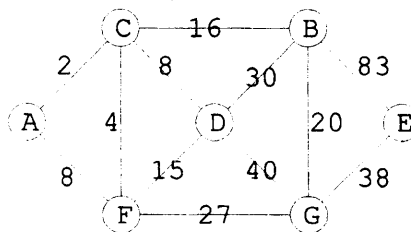
1. Write the postfix form of the following expressions: (10%)

(a)  $(A + B) * D + E / (F + A * D) + C$

(b)  $A * (B + C) * D$

2. Suppose we have the preorder sequence A、B、C、D、E、F、G、H、I and the inorder sequence B、C、A、E、D、G、H、F、I of the same binary tree. (a) Construct the binary tree from these sequences.(12%) (b) Write out the postorder traversal for the binary. (6%)

3. Consider the graph shown below. Using Prim's algorithm to find the minimum-cost spanning tree starting from vertex A. (10%)



4. Given any nonempty binary tree,  $T$ , assume that  $n_0$  is the number of leaf nodes and  $n_2$  the number of nodes of degree 2. Prove that  $n_0 = n_2 + 1$ . (10%)

5. (a) Show the result of inserting 70, 75, 42, 30, 76, 5 into an initially empty max heap. (10%)

(b) Show the result of deleting the root from the max heap. (10%)

6. (i) Determine what the following **recursive** function computes? (5%)

```
public static int func(int[] a, int m, int n, int k) {
    int x = (m + n) / 2;
    if(m > n) return -1;
    else if (k == a[x]) return x;
    else if (k > a[x]) return func(a, x + 1, n, k);
    else return func(a, m, x - 1, k);
}
```

(ii) Write an **iterative** function to accomplish the same purpose. (10%)

(iii) Given an *array* of ten integers (array index starting at 0) (8%)

$\text{int[] } a = \{1, 3, 7, 15, 21, 22, 36, 78, 95, 106\}$

Show the step-by-step trace of the function call  $\text{func}(a, 0, 9, 1)$ .

7. An algorithm takes 0.5 ms for input size 100. How long will it take for input size 500 if the running time is the following (assume low-order terms are negligible): (9%)

(a) Linear    (b) quadratic    (c) cubic