編號： 120

國立成功大學 109 學年度碩士班招生考試試題

系　　所：工程科學系

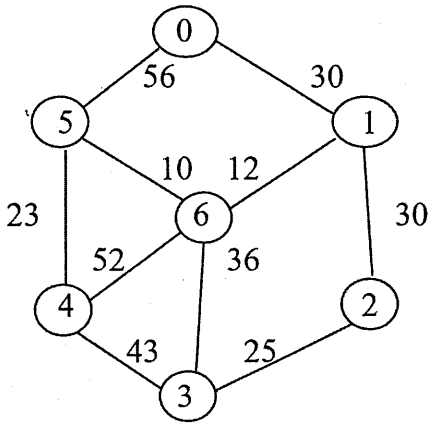
考試科目：資料結構

考試日期：0211，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. (a) Give the definition of the max heap. (5%)
   (b) Ten integers are inserted into an empty max heap in the following order. Please draw the final max heap. The properties of the max heap must be kept after each integer is inserted. 8 12 6 30 23 24 5 33 61 15. (10%)

2. (a) Suppose we have the pre-order sequence DAFIBEGHC and in-order sequence AFDBIGHEC. Construct the corresponding binary tree. (10%)
   (b) Use Sollin's algorithm to obtain the minimal cost spanning tree. (10%)



3. Analyze the time complexities for the following code fragments. (15%)

(a)
```
sum = 0 ;
for (k = 1 ; k <= n ; k *= 3)
  for (j = 1 ; j <= n ; j++)
    sum++ ;
```

(b)
```
sum = 0 ;
for (k = 1 ; k <= n ; k *= 2)
  for (j = 1 ; j <= k ; j++)
    sum++ ;
```

(c)
```
sum = 0 ;
for (k = 1 ; k <= n*n ; k *= 5)
  for (j = 1 ; j <= n ; j++)
    sum++ ;
```

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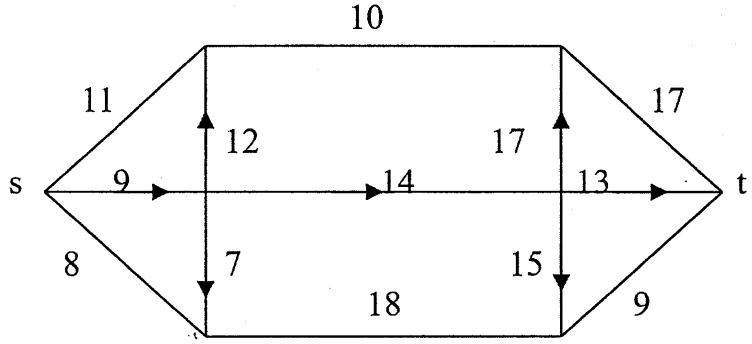
4. (a)Write the status of the list F=(12，25，19，2，25，3，29，8，17，81，6) at the end of each phase of Quick sort. (5%)
   (b) Write the decision tree for insertion sort based on the list of (a). (5%)
   (c) Compare time complexity of the best cases for the above two sorts. (5%)

5. Find the maximum flow of the following diagram. And explain briefly the method you used. (10%)



6. For the AOE(activity on edge) network shown below, do the following.
   (a) Compute the early starting time for each activity. (10%)
   (b) Compute the late starting time for each activity. (10%)
   (c) Determine the critical path of the project. (5%)