國立成功大學

112學年度碩士班招生考試試題

編　號：113

系　所：工程科學系

科　目：資料結構
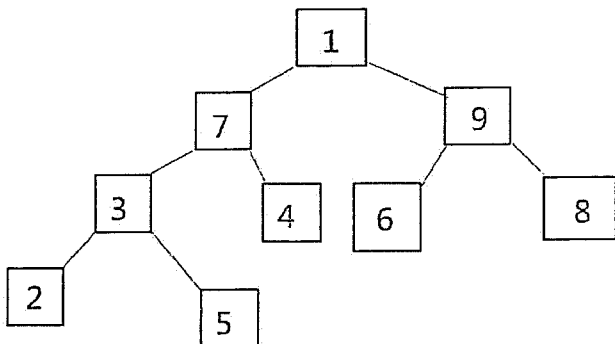
日　期：0207

節　次：第 1 節

備　註：不可使用計算機

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國立成功大學 112 學年度碩士班招生考試試題
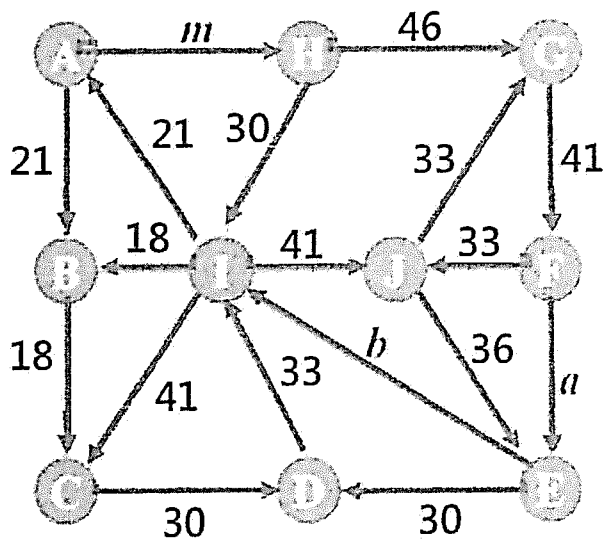系　　所：工程科學系
考試科目：資料結構
考試日期：0207，節次：1
第1頁，共2頁

※ 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. Please answer the questions by the following tree. (20%)

   (a) In-order traversal.

   (b) Pre-order traversal.

   (c) Post-order traversal.

2. Consider following a directed graph with weight and answering the questions. (20%)

(a) m = 18, b = 11, a = 5 find the shortest path and minimum cost from A to J.

(b) m = 34, b = 33, a = 31 find the shortest path and minimum cost from E to C.

(c) m = 8, b = 6, a = 8 find the shortest path and minimum cost from C to G.

(d) m = 25, b = 48, a = 73 find the shortest path and minimum cost from G to C.

3.　Assume a polynomial has K non-zero element, we will represent a 1-D array A[1...2K+1] as following hint. Please answer the following questions. (20%)

[hint]

1	2	3	4	5	....	2K+1
K	coefficient		exponent		...	...	...	..	..

(a) A polynomial is store in the above way, giving an array poly=[5,15,25,35,14,7,3,5,12,178,0], please translate the polynomial into P(x).

(b) P(x)=7x^5+9x^3+6, please use an array to represent P(x) in the above way.

4.　**Please change the follow two infix functions to prefix and postfix. (20%)**

　　(a)　A+B-C+D-E-F

　　(b)　G/(H+I-J)*K+L*(M-N)

5.　**Answer "True" or "False" to the following statements. (20%)**

　　(1). If we sort time complexity by execution time, $O(n^2)<O(n\log n)$.

　　(2). The Big-O of the polynomial $8n^2+5n+51$ is $O(n^2)$.

　　(3). If the polynomial $f(x)=16x^6+8x^4+63x^2+85x$ stored by coefficients, you need an array of length 7.

　　(4). The linked-list allows random access, but arrays only allow sequence access.

　　(5). When the type and number of elements are the same, the memory space used by linked-list will be more than array.

　　(6). When doing quicksort,assume that we can split the array in half with every pivot we choose,we can reach the best case of time complexity,which is $O(n\lg n)$.

　　(7). When doing quicksort,assume that we choose the first element of the subarray as pivot in every round,we will reach the worst case of time complexity whether the array was originally in ascending or descending order.

　　(8). A stable sorting means that the time complexity of the algorithm stays the same in best case, worst case and average case,eg.heap sort,merge sort.

　　(9). When doing insertion sort,if we insert the smallest element to the front and the largest element to the end in one round,the time complexity will be better($n^{3/2}$).

　　(10).　The space complexity if heap sort is $O(1)$.