(丙) 資料結構

國立成功大學 九 學年度 工程科學研究所 考試 (DATA STRUCTURES 試題) 共 1 頁 第 1 頁

1. Let BA is the Base Address for the first element of any array, Given the following arrays stored by column (column-major) drive the appropriate mapping functions (10%)
   (a). array C[1:m,1:n]; (b). array D[-1:m,0:n,-p:q]

2. Represent the following arithmetics expressions as trees (10%)
   (a). $a^5 + 5a^3 - 2a + 7$ (b). a/b/c + d*e*sin(f+g) + logt

3. Given the eight keys: 6, 5, 7, 1, 3, 2, 4, 8 (10%)
   How many actual comparisons and key exchanges are required by the following methods ? (a) Bubble sort (b) Insertion sort

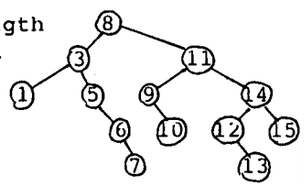
4. In a sparse matrix, each column and row will be a circularly linked list with a head node and its nonzero elements, (a). what is the node structure.
   (b). How to represent the sparse matrix as shown below. (10%)

$$\begin{bmatrix} 0 & 0 & 5 & 0 \\ 0 & 8 & 0 & 0 \\ 0 & 0 & 0 & 3 \\ 4 & 0 & 0 & 0 \end{bmatrix}$$

5. (a). What kind of operations that performed on the lists. (10%)
   (b). How to build a linked list for polynomial $a(x)= 3x^2 + 6x + 8$

6. Explain the Buddy system and Fibonacci for memory management. (10%)

7. A binary tree is shown as below (10%)
   (a) What is the internal path length and external path length
   (b) What is the average number of comparisons required for a successful search in a binary search tree with n node and internal path length I



8. A linear doubly linked list which is organized with three fields node, left field, information field and right field. Write an algorithm or programs to insert a node with information y to the right of node [P]. (10%)

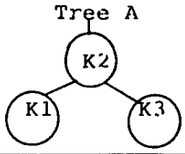
9. Write an algorithm to transform from prefix to postfix. (10%)
   Crefully state any assumptions you make regarding the input.

10. Let K1, K2 and K3 are three elements where K1 < K2 < K3 , suppose P1, P2 and P3 are the probabilities that the search argument equals K1, K2 and K3, respectively, q0, q1, q2 and q3 are the probability shown below

    q0 < K1
    K1 < q1 < K2
    K2 < q2 < K3
    K3 < q3

    Find the expected number of comparisons for the following binary tree A and Tree B. (10%)

Tree A



Tree B