國 立 清 華 大 學 命 題 紙

八十八學年度 通訊工程研究所 系(所) 乙 組碩士班研究生招生考試

科目 資料結構 科號 4302 共 2 頁第 1 頁 *請在試卷【答案卷】內作答

1. A linked list does not have to be implemented with pointers. Suggest other implementations of linked lists. (5%)

2. The sequential search is used with a list of *n* items.

   (a) What is the least number of comparisons the search will take? (3%)
   (b) What is the maximum number of comparisons the search will take? (3%)
   (c) What is the expected number of comparisons? (3%)

3. The binary search is used with a list of *n* items.

   (a) What is the least number of comparisons the search will take? (3%)
   (b) What is the maximum number of comparisons required? (3%)

4. Give two applications for stacks in a computer program. (8%)

5. (4%) Find all that apply. A STACK is a structure implementing

   (a) first-in/last-out (b) last-in/first-out (c) first-come/first-serve

   (d) first-in/first-out (e) last-in/last-out

6. (4%) Find all that apply. A queue is a structure implementing

   (a) first-in/last-out (b) last-in/first-out (c) first-come/first-serve

   (d) first-in/first-out (e) last-in/last-out

7. (4%) Convert the following expression to postfix:

   (b*b-4*a*c)/(2*a)

8. (4%) Write the following expressions in infix form:

   abcde++**ef-*

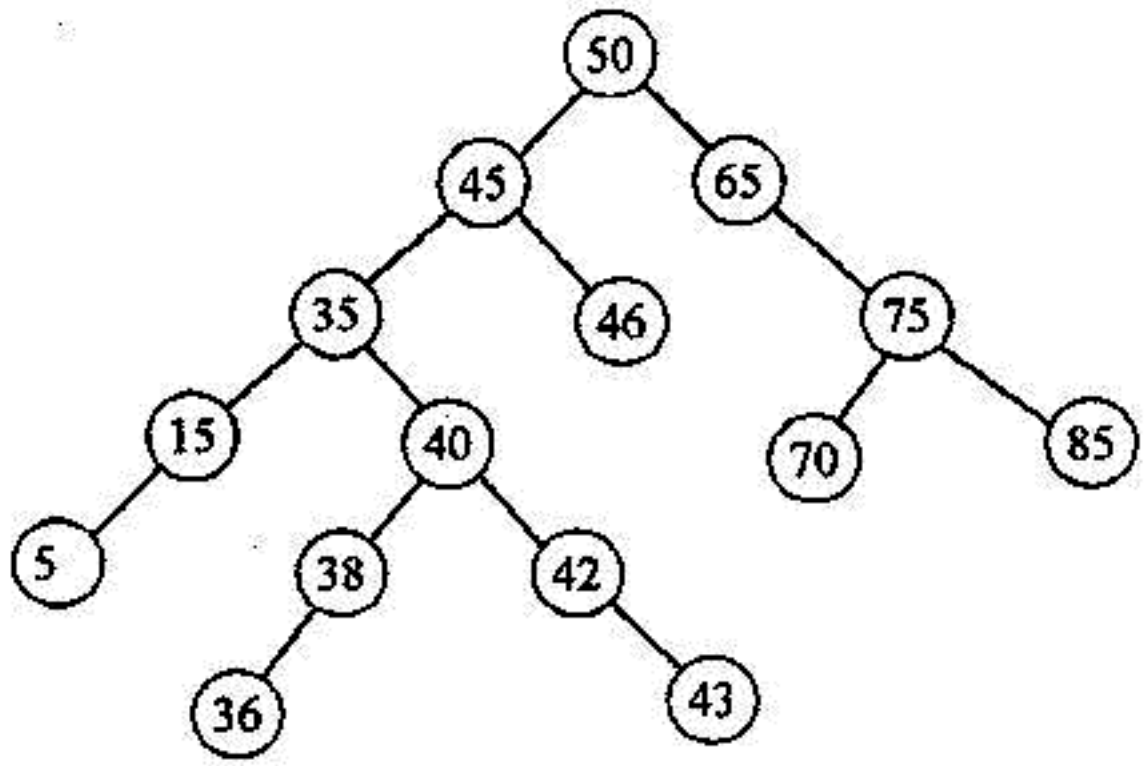
9. What is the minimum depth of a binary tree that contains *n* nodes? (4%)

10. What is the number edges in a binary tree with *n* nodes? (4%)

11. (a) Sort the sequence 8, 4, 1, 9, 2, 1, 7, 4 using the selection sort. You should show the list at the end of each pass. (8%)

    (b) Repeat (a) for the insertion sort. (8%)

12. Consider the following binary tree:



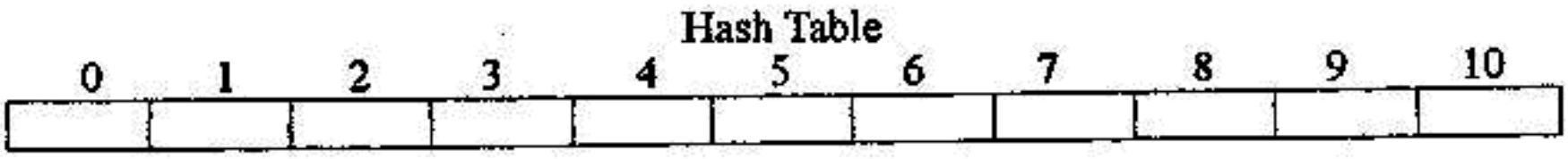
(a) Traverse the tree using preorder, inorder, and postorder scans. (12%)
(b) If the value 30 is inserted into the tree, which node is its parent? (4%)

13. Assume that a hash function has the following characteristics:

Keys 257 and 567 hash to 3,
Keys 987 and 313 hash to 6,
Keys 734, 189 and 575 hash to 5,
Keys 122, and 391 hash to 8

Assume that insertions are done in order 257, 987, 122, 575, 189, 734, 567, 313, 391.

(a) Indicate the position of the data if open probe addressing is used to resolve collision. (8%)



(b) Indicate the position of the data if chaining with separate lists is used to resolve collision. (8%)