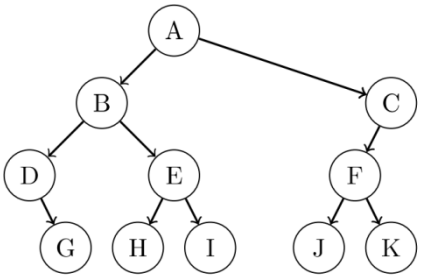
Bach Khoa University
Faculty of Computer Science and Engineering

DATA STRUCTURES AND ALGORITHMS

Periodic examination - Test 2
Time: 90 minutes

Fill in the blanks *(0.5 point/question)*:

Q1. Give a tree:



Preorder traversal of above tree is: _____

_____

Q2. Size of a hash table is $m=17$, address space is [0..16], hash function $h(k)=k\%16$ and quadratic probing method is used for collision resolution. Suppose hash table saved 4 values: 151515, 151516, 151525, 151536. The address after inserting value **151549** into the hash table is: _____

Q3. Give a coding segment following:

$i=k=0;$

$while(k<n^2)\{i++;k+=i;\}$

The complexity (Big-O) of the segment is: _____

Q4. The maximum of nodes have 10^{th} degree in a binary tree is : _____

Q5. Insert step-by-step each number in series: 8, 6, 12, 10, 15 into an AVL tree. The root is: _____

Q6. Inserting one more node 9 into above AVL tree (Q5). The root is: _____

Q7. Give a function:

```
int foo(int x, int y){
        if (x > y) return -1;
        else if (x == y) return 1;
        else return x * foo(x+1, y) + 1;
}
```

The result of function call $foo(4,6)$ is: _____

Q8. Suppose p pointer pointed to a node in singly linked list and $p\Pr e$ pointer pointed to previous node. Some statements remove the node which p pointer pointed to: _____

_____

_____

Q9. The minimum height of binary tree which has 42 nodes is _____

Q10. Result of *prefix* expression $-+*9+28*+4863$ is _____

Q11. Construct max-heap by series: 12, 7, 26, 5, 9, 17, 10, 50, 3, 22. The max-heap is represented by array format and the final result is: _____

_____

Q12. Construct Binary Search Tree (BST) by inserting step-by-step following values: 24, 18, 10, 57, 36, 15, 31, 83, 76, 28. Draw the final tree.

Q13. Is above result an AVL tree? Why?

Q14. If the result in Q12 is not an AVL tree, re-balance that BST in order to become an AVL tree (draw the AVL tree into the blank). If not, skip the step. Next, insert a node 32 into the AVL tree and draw it.

Q15. Convert infix expression to postfix expression. $(A+B*(C-D))*E-F*G$

_____

Q16. A binary tree has 10 nodes. The preorder traverse is JCBADEFIGH and the inorder traverse is ABCEDFJGIH. Draw the tree.

Q17. Give an integer stack S and an integer queue Q. Draw stack S and queue Q after running the 10^{th} line.

1. $pushStack(S,4)$
2. $pushStack(S,6)$
3. $enQueue(Q,26)$
4. $enQueue(Q,8)$
5. $popStack(S,x)$
6. $pushStack(S,2*x)$
7. $enQueue(Q,x-3)$
8. $deQueue(Q,y)$
9. $pushStack(S,x+4)$
10. $pushStack(S,y-x)$

Q18. An 1-dimensional array has n elements. Delete the $(i-1)^{th}$ element $(1 \le i \le n)$. How many moving elements are there? _____

Q19. What are the advantages between Binary Search Tree and Linked List?

Q20. Give a function:

```
int fx(int n){
    if (n <= 0) return 0;
    else if (n%2 == 0) return fx(n-1) + fx(n-2) + n;
    else return 2* fx(n-1) + 1;
}
```

The result of function call $fx(8)$ is: _____