CSE 225: Data Structure and Algorithm

SEC-05 Summer 2021, Faculty – MKN1

Midterm Exam

Marks: 30 Time: 1 Hours 10 Minutes

Please read the instructions before you proceed:

- This is an open book Exam. Submit handwritten answer script.
- Do not use any unfair means. If you cheat in any form or do not follow faculty instructions your examination will be cancelled.
- After you complete the assignment rename it with your Name and ID and upload **ID_Name.pdf** then turn-in.

1. a) Convert **X= H * A + ((B + C) ^ D)** into Postfix from showing stack status after every step in tabular form. 5

   b) assuming dequeue() and pop() print the values removed, what is printed by: 5

   i)

```
queue q; // queue of int
q.enque(8);
q.enque(4);
q.deque();// prints
q.enqueue(1);
q.deque();// prints
q.deque();// prints
```

   ii)

```
stack s; // stack of int
s.push(15);
s.push(13);
s.pop(); // prints
s.push(17);
s.push(16);
s.pop(); // prints
s.pop(); // prints
s.pop(); // prints
```

2 a) Evaluate the expression using stack. show the details table P:= 10 2 8 * + 3 - 3

b) In implementing a Queue using an array, a problem might arise if the Queue is implemented in such a way that items in the Queue are inserted at the next available location and removed from the next leading position, but such that, once deleted, the emptied space is unused. The problem that arises is one where there is free space still in the array, but it is not useable because it is not at the end. Demonstrate this problem with a Queue that is stored in an array of size 5 for the following instructions. Next, explain how you might resolve this problem. 3

Queue q = new Queue(5); // assume the Queue constructor takes 5 as the size of the array

```
q.enqueue(3);
q.dequeue( );
q.enqueue(6);
q.enqueue(4);
q.enqueue(1);
q.dequeue( );
q.enqueue(5);
q.dequeue( );
q.enqueue(7);
```

c) Consider the following recursive method. 4

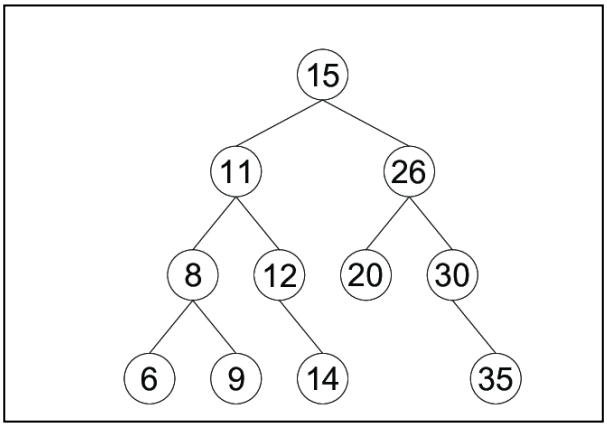
```
int recursum(int a, int b)
{
if (a%b == 0)
    return b;
else
return recursum (b, a%b);
}
```

a. What is the output given by recursum (35, 8)?

b. What is the output given by recursum (13, 9) ?

3 a) Consider the binary tree shown below. For each of the traversals listed, give the order in which the nodes are visited. 3

preorder	
inorder	
postorder	



b) Suppose the numbers 15, 18, 11, 17, 13, 16, 10, 19, 14 are inserted in the given order into an initially empty binary search tree. The binary search tree uses the usual ordering on natural numbers. 3

What is the Preorder traversal sequence of the resultant tree?

c) Construct a binary tree from the following traversing sequence of integers. Find its postorder traversal. 4

Preorder: 15, 13, 12, 11, 14, 17, 16, 19, 18, 20

Inorder: **11, 12, 13, 14, 15, 16, 17, 18, 19, 20**