NATIONAL UNIVERSITY OF MODERN LANGUAGES ISLAMABAD
Department of Computer Science
End Term Examination Spring 2021

Paper: Data Structure and Algorithm — **Total Marks : 30**
Time allowed: 2 hours — **BSCS 3 Morning**

Question No: 1 (10 Marks) (30 minutes)

(a) What does the following function compute? Also show complete dry run and output if this function is called using f (8).

```
int f(int n) {
    if (n == 0)
        return 0;
    if (n == 1)
        return 1;
    if (n == 2)
        return 1;
    return 2*f(n-2) + f(n-3);
}
```

(b) Evaluate the following expression using Binary expression tree. Show each step.

((4 + 5) * (14 / 7) + 26 - 2)

Question No: 2: (10 Marks) (35 Minutes)

a) Create hash table of size 15, if there are collision resolve it via double hashing. Show hash table and its complete working according to given scenarios:
What happens when inserting the following sequence of keys into it:

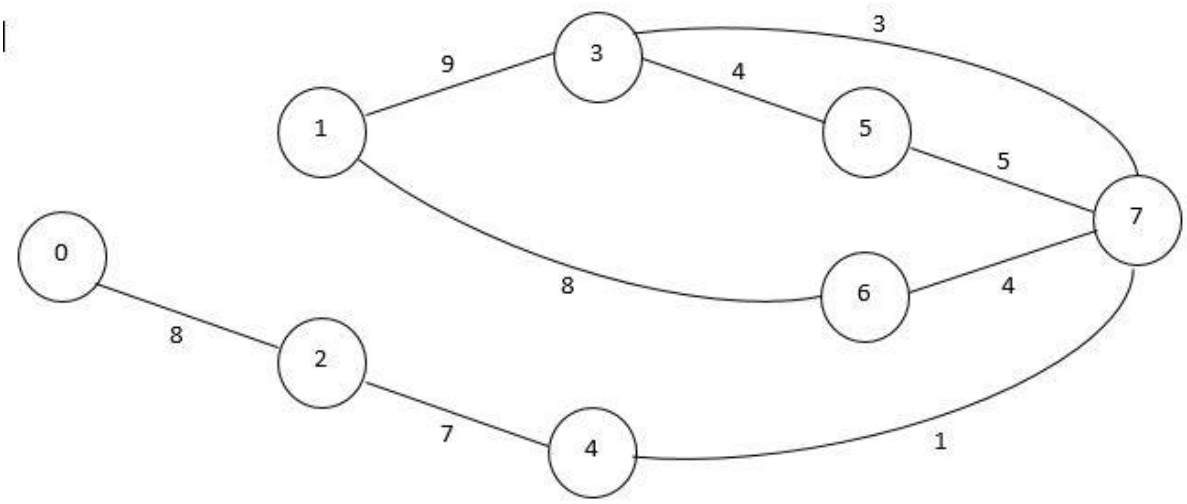
200, 123, 287, 107, 69, 29, 19, 18, 25, 10, 30.
Do rehashing if necessary.

(b) Write a function that traverse a binary search tree in descending order.

c) If sorting is not allowed in enqueue() operation, then how priority queues can be implemented?

Question No: 3: (10 Marks) (25 Minutes)

a) The following network has 8 vertices from 0-7. The number on each edge represents the distance between a pair of adjacent vertices.



Use kruskal's algorithm to find the minimum spanning tree for the network Also show DFS ordering of minimum spanning tree starting from vertex 7.

b) Decide whether these statements are True or False. You must briefly justify your answers.

i) $n^k \varepsilon O(c^n)$
ii) $25n+100n^2 \varepsilon \theta(n)$

_____GOOD LUCK ☺_____