MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

I SEMESTER M.TECH. (CSE/CSIS)
END SEMESTER EXAMINATIONS, Nov/Dec 2023

Advanced Data Structures and Algorithms [CSE 5113]

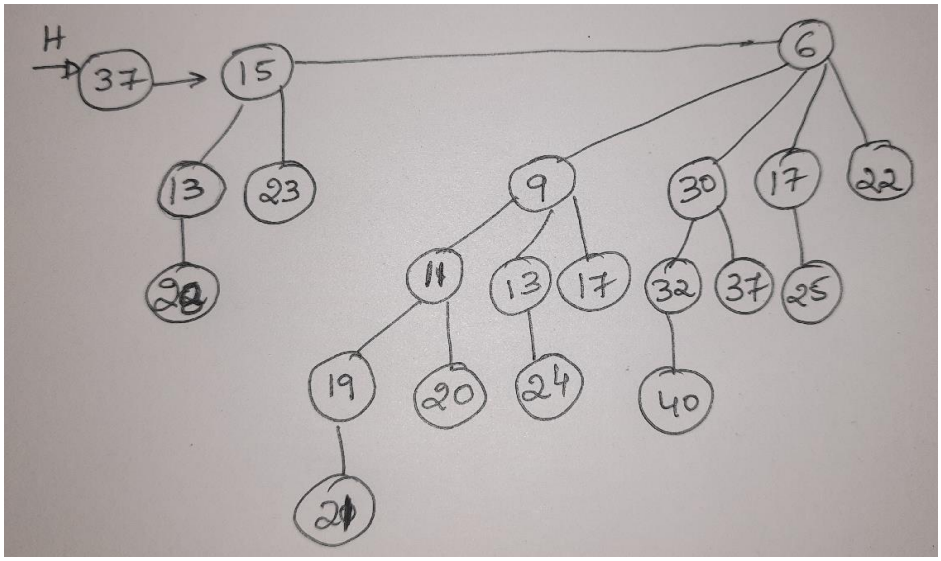
REVISED CREDIT SYSTEM

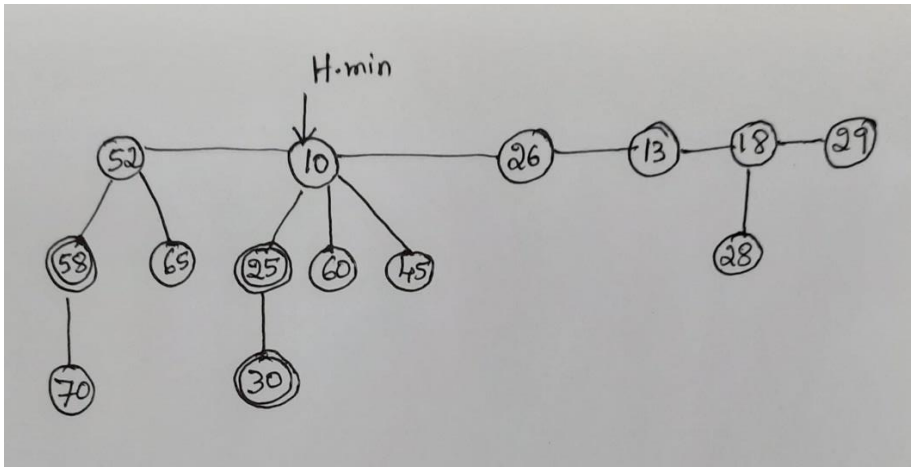
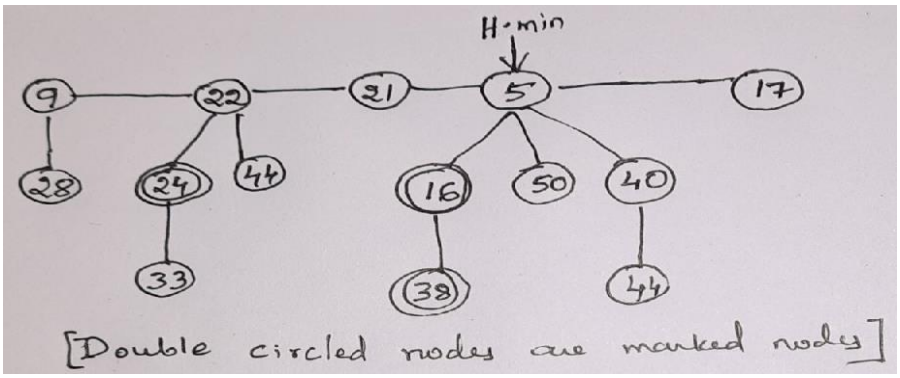
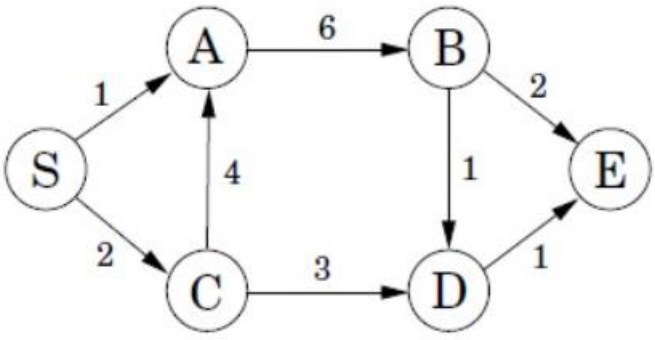
(30/11/2023)

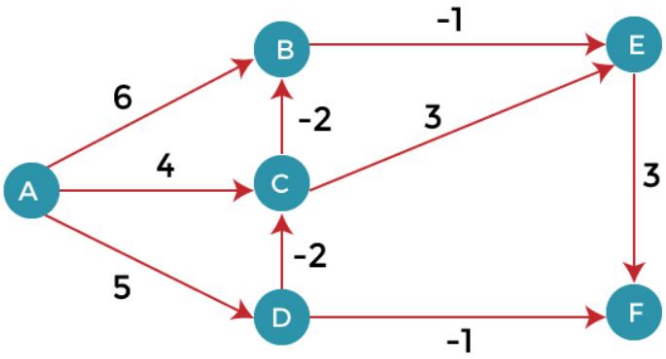
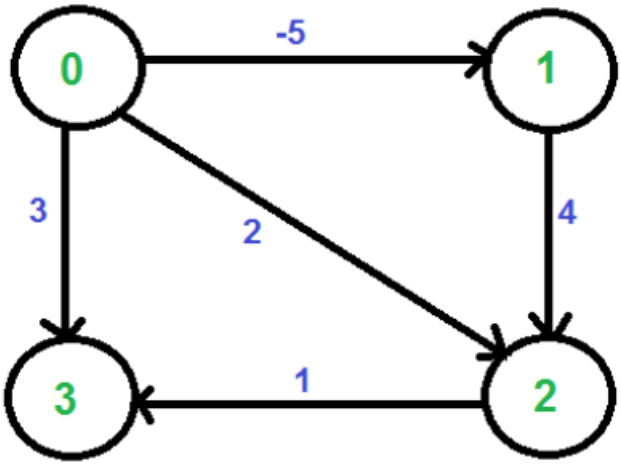
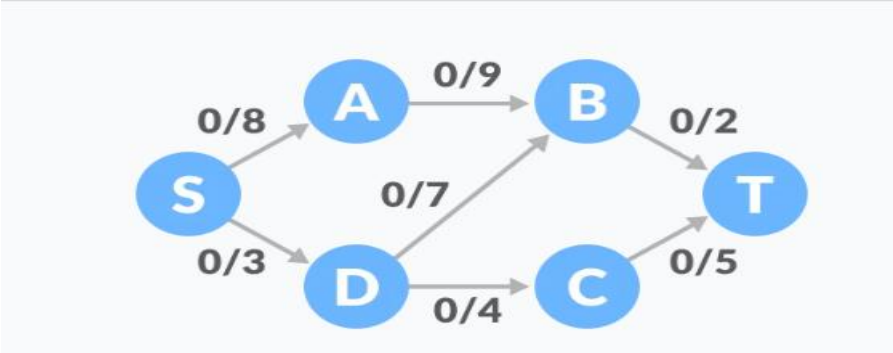
Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data, if any, may be suitably assumed.

Q.No	Questions	Marks
1A	What are the differences between aggregate analysis and accounting method of amortized analysis to compute cost of sequence of operations. Compute the amortized cost of implementing a k-bit binary counter that counts upward from 0, using aggregate analysis and accounting method	3
1B	Suppose we perform a sequence of 'n' operations on a data structure in which the i^{th} operation costs i if i is an exact power of 2, otherwise it is 1. Use potential method to determine the amortized cost per operation.	2
1C	Show the construction of B-Tree with degree t=2 for the list: 8, 21, 19, 13, 5, 14, 10, 22, 24, 15, 20, 16, 18, 4, 26, 27, 6, 28, 7, starting from empty tree by inserting a key into B-Tree in a single pass down the tree.	5
2A	How to extract the node with minimum key from Binomial Heap	2
2B	Clearly showing all the stages, delete the key 9 from the following binomial heap (Figure 2B)  Figure 2B.	5

2C	Decrease the node value 30 to 15 from the following Fibonacci heap shown in Figure 2C  Figure 2C.	3
3A	Extract the minimum key and do consolidation for the Fibonacci heap shown in Figure 3A by showing all the steps  Figure 3A	5
3B	Apply Dijkstra's algorithm for the graph given in figure 3B with S as the source vertex  Figure 3B	3
3C	Compare Bellman ford algorithm with DAG algorithm for finding shortest path.	2

4A	Apply shortest path using DAG for the graph given in figure 4A with A as source vertex.  Figure 4A	5
4B	Construct the tree representation for the following disjoint sets {a,b,c,d,e} and {f,g,h} find the union of the disjoint sets	3
4C	Compare Disjoint set with the DFS for finding the connected components	2
5A	Apply Johnson algorithm for the graph given in figure 5A.  Figure 5A	5
5B	Apply Ford Fulkerson method for the graph given in figure. 5B.  Figure 5B	3
5C	Identify the number of fork calls required to create 32 paths of control.	2