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.

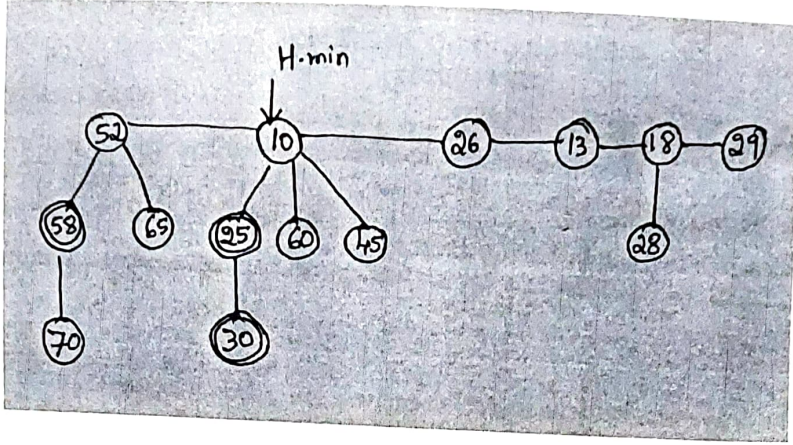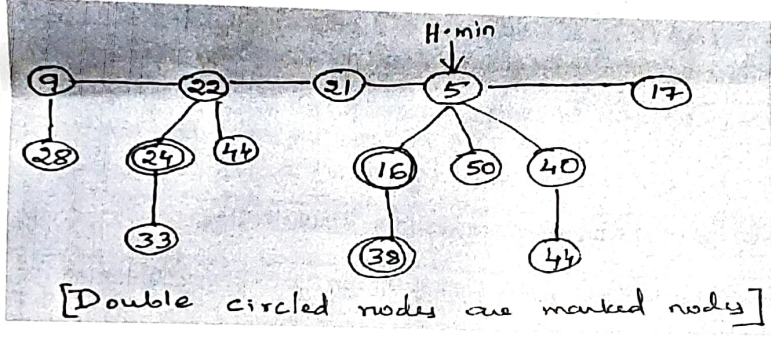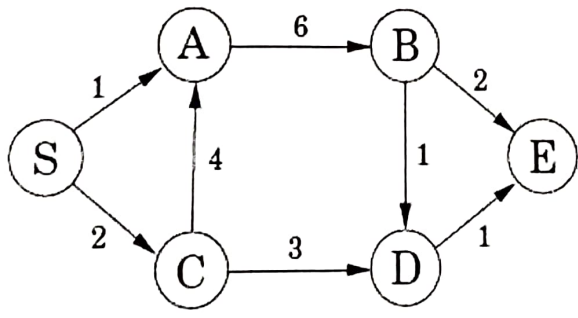| Q.No	Questions	Marks
1A	What are the differences between aggregate analysis and accounting method of amortized analysis to compute cost of sequence of operations. Compute the amortized cost of implementing a k-bit binary counter that counts upward from 0, using aggregate analysis and accounting method	3
1B	Suppose we perform a sequence of 'n' operations on a data structure in which the ith 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)	5
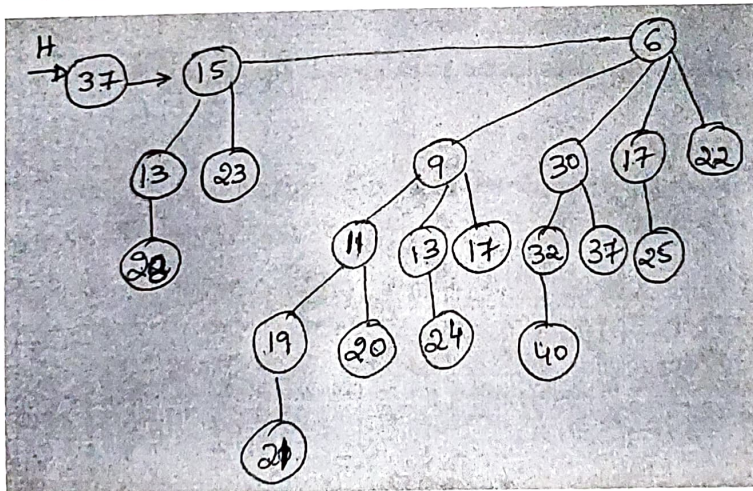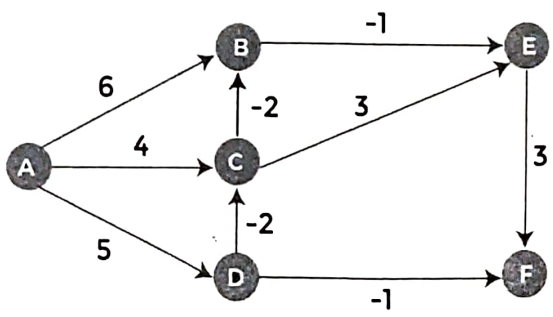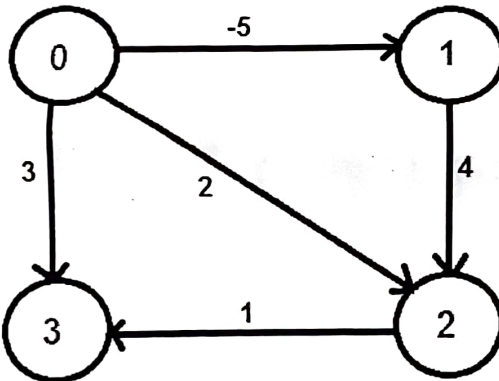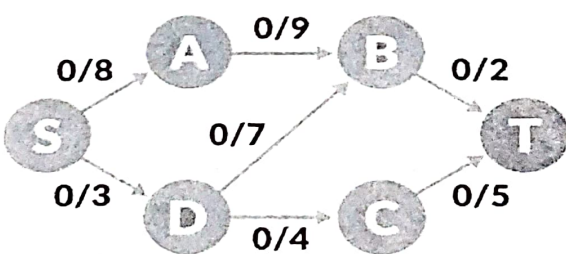
Figure 2B.

2C	Decrease the node value 30 to 15 from the following Fibonacci heap shown in Figure 2C		3

Figure 2C.

3A	Extract the minimum key and do consolidation for the Fibonacci heap shown in Figure 3A by showing all the steps		5

[Double circled nodes are marked nodes]

Figure 3A

3B	Apply Dijkstra's algorithm for the graph given in figure 3B with S as the source vertex		3

Figure 3B

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.	5

Figure 4A

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.	5

Figure 5A

5B	Apply Ford Fulkerson method for the graph given in figure. 5B.	3

Figure 5B

5C	Identify the number of fork calls required to create 32 paths of control.	2

Page 3/3