

NATIONAL INSTITUTE OF TECHNOLOGY ROURKELA
END SEMESTER EXAMINATION, 2018
 SESSION: 2018 – 2019 (Autumn)

Subject Code: CS2005

Subject Name: Data Structures and Algorithms

Dept. Code: CS

No. of pages: 2

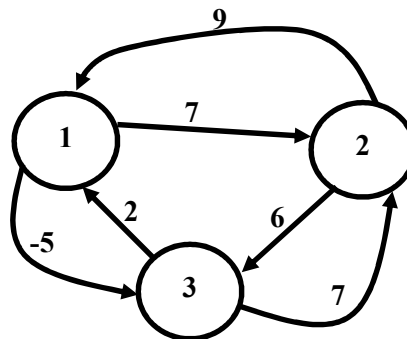
Full Marks: 50

Duration: 3 Hrs.

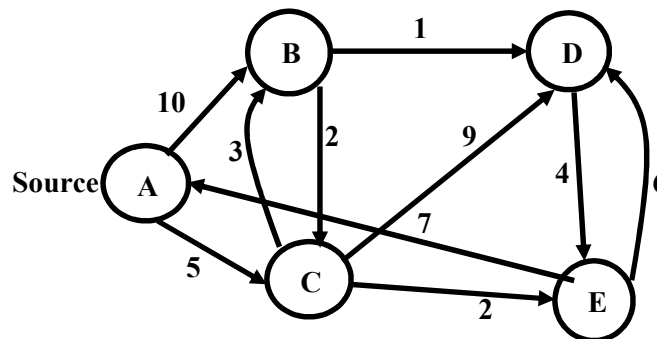
Answer All Questions

Marks

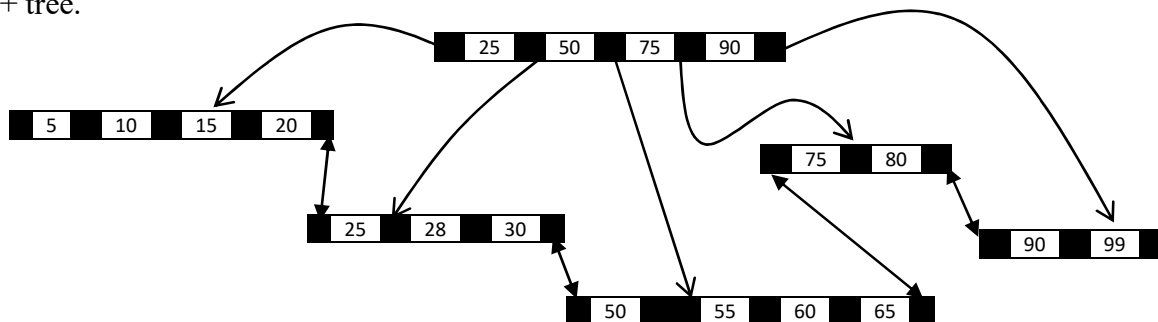
- 1 What are the parameters that can be used to check for overflow conditions while implementing a circular queue using linked list? 1
- 2 What are the advantages of AVL tree over BST? 1
- 3 Give some scenarios where adjacency matrix would be preferred over adjacency list to represent a graph and vice versa. 1
- 4 In the linked list implementation of queue, the header is made to point the rear of the queue (True/False) 1
- 5 What is the prefix expression of $(a-b/((c*d)-e))/f$? 1
- 6 What is the postfix expression of $(a-b/((c*d)-e))/(f*g+h)-i$? 1
- 7 Given the linked list, **header**->[2,8,30,27,32,2,8,5,70,80,60,70,65,80,90,55,60,55,20,60]. Write the pseudo-code or code or code-snippet to obtain the linked list, **header**->[60,20,55,60,55,70,80,60,70,65,80,90,5,8,2,32,27,30,8,2] from the above given linked list. Use of any other data structure & global variables are not allowed. 5
- 8 Graphically, show the stepwise construction of the shortest path length matrix and shortest path matrix for the given graph using Floyd-Warshall algorithm. 5



- 9 Graphically, show the stepwise computation of the shortest paths from source node-A to all other nodes of the given graph using Dijkstra's algorithm with min heap. 5



- 10 Sort the input data 8,2,4,14,1,7,3,9,16,10 in ascending order using heapsort with max-heap data structure. Graphically show the state of the max-heap for each step of the heapsort. 5
- 11 Graphically construct an AVL tree by performing the following operations in the sequence given below: insert(50,60,40,56,20,70,65,45,80), delete(60), insert(75), delete(40), insert(48,49,10,30,25,35), delete(10,75,65,80,56,49,48,70). 6
- 12 First, insert(70,22,29,31,33,68,79,84,86) in the given B+ tree of order 5 to obtain an intermediate B+ tree. Next, delete(5,29,65,79,80,10,30,66) from the intermediate B+ tree to obtain the final B+ tree. 6



- 13 The in-order and post-order traversal of a binary tree is DBHEIAFJCG and DHIEBJFGCA respectively. Graphically, construct the binary tree using the two traversals. 3
- 14 Given an input array [7,1,6,2,5,7,1,8,9,5,7,2,3,5,4,9,12,15,11,13,12,15]. Sort it in ascending order using counting sort. Graphically, show each step of the sorting process. 3
- 15 Given the input array [50,44,67,34,56,88,22,80,45,51,98,95,68,42,18,32]. Sort it in ascending order using randomized quick sort. Graphically, show each step of the sorting process. 3
- 16 Given the input array [0.78,0.17,0.39,0.26,0.72,0.94,0.21,0.12,0.23,0.68]. Sort it in ascending order using bucket sort. Graphically, show each step of the sorting process. 3
