

Computer Science & Engineering Department

End Semester Exam-November 2022

| Max Marks: 50 | |
|---------------------------|--|
| Duration: 03 Hours | |
| Semester: 5 th | |
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- Q.1 a) Define data structure. List the various linear and non-linear data structures and explain [4] them in brief.
 - b) What is the space and time complexity of an algorithm? What are the different [4] asymptotic notations used for finding the best, average and worst case time complexity of an algorithm?
 - c) Write the best case and worst case complexity of the following algorithms along with [2] the input which will be best and worst case for them:
 - i. Quick sort
 - ii. Insertion sort
- Q.2 a) Write an algorithm to merge two sorted arrays into one and the resultant array must [4] be sorted.
 - b) Write an algorithm to push an element onto the stack implemented using linked list. [2]
 - c) Write an algorithm to delete an element from the queue implemented using linked [2] list.
 - d) What is the drawback of a linear or ordinary queue? How do we resolve it? Explain [2] with an example.
- Q.3 a) Construct the tree using the following traversals
 Preorder traversal of the tree is: 7, 1, 0, 3, 2, 5, 4, 6, 9, 8, 10 [5]
 Inorder traversal of the tree is: 0, 1,2,3,4,5,6,7,8,9,10
 Explain each step in detail. What is the Postorder traversal?
 - b) First insert 11 and then insert 35. After these insertions, delete 26 and, delete 14 and [5] then delete 17 from the following binary search tree. Draw the tree after each operation.





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Q.4 a) Draw the minimum spanning tree (MST) of the following graph using Kruskal's algorithm. Explain each step and write the weight of the resulting MST.



b) Using Dijkstra's Algorithm, find the shortest distance from source vertex 'S' to remaining vertices in the following graph. Explain each step in detail.



- Q.5 a) Is the sequence 23, 17, 14, 6, 13, 10, 1, 5, 7, 12 a max-heap?
 - b) Where in a max-heap might the smallest element reside, assuming that all elements are distinct?
 - c) What are the minimum and maximum numbers of elements in a heap of height h?
 - d) Demonstrate the insertion of the keys 5, 28, 19, 15, 20, 33, 12, 17, 10 into a hash table with collisions resolved by chaining. Let the table have 9 slots, and let the hash function be h(k) = k mod 9.

[5]

[2]

[2]

[2]

[4]

[5]