BACHELOR OF TECHNOLOGY (CBCS - 2023)
B. Tech. Sem-III INFORMATION TECHNOLOGY : WINTER : 2024
SUBJECT: DATA STRUCTURES

Day : Thursday
Date : 05/12/2024

W-29247-2024

Time : 10:00 AM-01:00 PM
Max. Marks : 60

N.B.

1) All questions are **COMPULSORY.**
2) Figures to the right indicate **FULL** marks.
3) Draw neat and labeled diagrams, **WHEREVER** necessary.
4) Assume suitable data, if necessary.

Q.1 Explain the significance of asymptotic notations. How do these notations help in comparing the efficiency of algorithm? **[10]**

OR

Q.1 What are the characteristics of a good algorithm? Discuss with an example how the correctness, efficiency and simplicity of an algorithm can be measured. **[10]**

Q.2 Write a pseudo code for recursion using a stack. Explain how function calls and their returns are managed in the system stack. **[10]**

OR

Q.2 What is a circular queue? How does it overcome the limitations of a simple array-based queue implementation? Provide the pseudo code for the enqueue and dequeue operations in a circular queue. **[10]**

Q.3 Discuss the differences between static and dynamic memory allocation. How does dynamic memory allocation in linked lists enhance memory efficiency? **[10]**

OR

Q.3 Describe the realization of a singly linked list. Provide the pseudo code for operations viz; insertion at first, mid and end. **[10]**

Q.4 Write an algorithm for Binary Search Tree (BST) construction. Illustrate BST construction stepwise with suitable example. **[10]**

OR

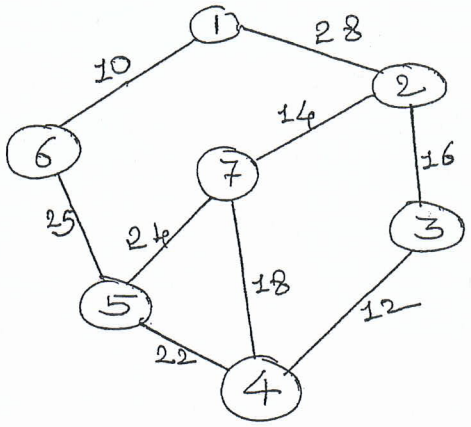
Q.4 Explain types of trees with suitable diagram. **[10]**

Q.5 Show the sum of the degrees of the vertices of an undirected graph is twice the number of edges. Also prove or disprove that : If F(V, E) is a finite directed graph such that the out-degree of each vertex is at least one, then there is directed cycle in G. **[10]**

OR

P.T.O.

Q.5 For a given graph, show steps in constructing minimum spanning tree using Prim's and Kruskal's Method. [10]



Q.6 What is a collision in hashing? Explain different collision resolution strategies. [10]

OR

Q.6 Explain the concept of file organization. Why is file organization important in data management? Discuss the different methods of file organization. [10]

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