PART A — (10 × 3 = 30 marks)

Answer ALL questions.

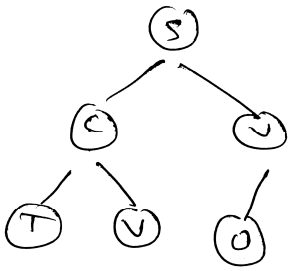
1. What is a data structure?

2. Define : Big 'O' notation.

3. Is list a data type? Give a definition.

4. If a string is placed character by character in a stack, will we get the original string or reversed string?

5. Represent the following Binary tree in an array



6. Define : Inorder Traversal.

7. What is an adjacency matrix?

8. Differentiate graphs and trees.

9. What is hashing?

10. Can we have a binary tree with 20 nodes if the order is FIVE?

PART B — (4 × 10 = 40 marks)

Answer any FOUR questions.

11. Explain how time complexity is calculated with an example. What are notations used?

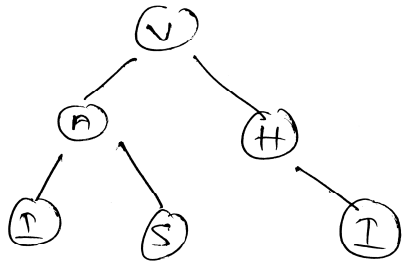
12. Give algorithm for counting the number of nodes in a circularly linked list.

13. Explain HEAP SORT with example.

14. Give an algorithm to count number of leaf nodes in a BINARY TREE T. Give its computing time.

15. Give the algorithm for BFS of a graph with examples.

16. For the Graph.



(a) Give adjacency matrix, list

(b) Give order in which DFS is performed

(c) Give indegree of each node.

PART C — (2 × 15 = 30 marks)

Answer any TWO questions.

17. What are STRINGS? How are they represented? Explain pattern matching with example.

18. Write an algorithm SWAPTREE (T) which a binary tree and swaps the left and right children of every node. Find space and time complexity of the algorithm.

19. Let $X = (X_1, X_2, X_3, \text{K } X_n)$

$Y = (Y_1, Y_2, Y_3 \text{K } Y_m)$

be two linked lists. Write an algorithm to obtain new linked list.

$Z = (X_1, Y_1, X_2, Y_2 \text{K } X_n)$ if $m \le n$ and

$Z = (X_1, Y_1, X_2, Y_2 \text{K } Y_m)$ if $m > n$ no additional lists to be used.