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Supplementary/ Improvement Examination-2023

Paper Name: Data Structures
Total marks: 75

Paper Code: BTCSE 303
Total Time: 3 hr.

SECTION A

All questions are compulsory.

7×5=35marks

Ques 1. Explain the procedure of selection sort. Give suitable example.

Ques 2. Define stack.

Consider the following stack of characters of size $N = 4$ memory cells

STACK: X, Y, _, _ . (_ means empty allocated cell)

Describe the stack (with value of TOP) as the following operations takes place:

- | | | |
|-----------------------|-----------------------|---------------------|
| (a) PUSH (STACK, A) | (b) PUSH (STACK, B) | (c) PUSH (STACK, C) |
| (d) POP (STACK, ITEM) | (e) POP (STACK, ITEM) | (f) PUSH (STACK, D) |

Ques 3. Explain sibling nodes, parent node and degree of a vertex in case of a tree. (with figure)

Ques 4. Define Circular queue & mention its advantages with the help of an example.

Ques 5. Differentiate between Graph and Tree.

Ques 6. Convert the expression $(A/B) - (C * D) / E - (F * (H^K))$ into Postfix.

Ques 7. Define minheap.

Construct the min-heap tree for following elements:

25, 57, 48, 37, 12, 92, 33, 66, 70, 54, 15, 33, 64

SECTION B

Attempt any Four questions.

4 X 10 = 40 marks

Ques 1.

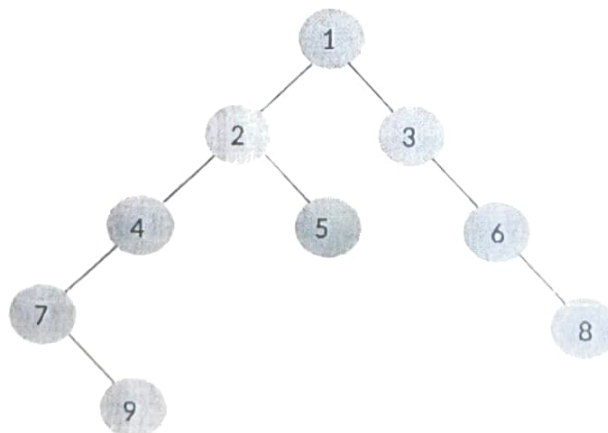


Fig. 1

- i. For the tree in **Fig. 1** perform pre order and post order traversal.
- ii. Write a function for in-order traversal.

Ques 2. Define queue. Explain the primitive operations on stack with the help of an example.

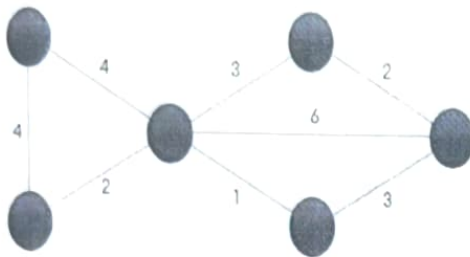


Fig. 2

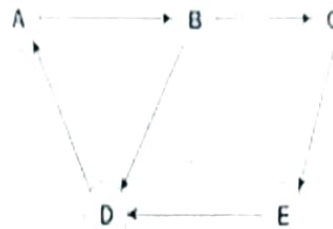


Fig. 3

Ques 3.

- i. Explain adjacency matrix and adjacency list graph representation techniques.
- ii. Represent the graph in **Fig. 2** using adjacency matrix graph representation technique.

Ques 4. Define binary search tree.

Draw the binary search tree by inserting the following data arriving in sequence –

6, 7, 3, 66, 89, 56, 67, 100, 72, 28, 26, 38

Delete node 56 from the BST so constructed and draw the resultant tree.

Ques 5. Find the sequence of nodes using Depth First Search algorithm for the above graph (**Fig.3**) starting from node A.

Ques 6.

- i. Compare singly linked list and doubly linked list.
- ii. Write the code snippet to add an element at the beginning of a singly linked list.