P P SAVANI UNIVERSITY

Second Semester of B.Sc. (IT) Examination

May 2022

SSIT1040 Data Structures

01.06.2022, Wednesday **Time: 10:00 a.m. To 12:30 p.m.** **Maximum Marks: 60**

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in same answer sheet.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

SECTION – I

Q - 1	**Answer the Following: (Any Five)**	**[05]**
(i)	What is row major order?	
(ii)	Define Primitive data structures.	
(iii)	When a pop() operation is called on an empty stack, what is the condition called?	
(iv)	In which data structures are FRONT and REAR pointers used?	
(v)	What is the condition for Stack Overflow, considering a Stack S with size N and TOP pointer pointing to top element of the Stack?	
(vi)	Write the postfix form of the expression: (A + B) * (C - D)	
(vii)	Which of the data structures finds its use in recursion?	
Q - 2 (a)	Explain difference between Stack and Queue.	**[05]**
Q - 2 (b)	Define data structure. List the various linear and non-linear data structures and explain them in brief.	**[05]**
	OR	
Q - 2 (a)	Consider the stack S of characters, where S is allocated 8 memory cells. S: A, C, D, F, K, _, _, _ Describe the stack as the following operations take place. Pop(), Pop(), Push(L), Push(P), Pop(), Push(R), Push (S), Pop()	**[05]**
Q - 2 (b)	Write the algorithms for performing PUSH and POP operations on a stack.	**[05]**
Q - 3 (a)	Write a program to insert a node at the end of a singly linked list.	**[05]**
Q - 3 (b)	Write an algorithm for Selection sort.	**[05]**
	OR	
Q - 3 (a)	What is a linked list? Are linked lists of linear or non-linear type? How are linked lists more efficient than arrays?	**[05]**
Q - 3 (b)	What is a queue? What are the applications of queue?	**[05]**
Q - 4	**Attempt any one.**	**[05]**
(i)	What is prefix notation? Convert the following infix expression into prefix. (A + B) * C - (D - E) * (F + G)	
(ii)	Write an algorithm to perform various operations (insert, delete and display) for simple queue	

SECTION – II

Q - 1	**Answer the Following: (Any five)**	**[05]**
(i)	What is a node in linked list?	
(ii)	Define Graph.	
(iii)	Define Forest.	
(iv)	What is Circular queue?	
(v)	Which of the following represents the Pre-order Traversal of a Binary Tree? a) Left -> Right -> Root b) Left -> Root -> Right	

c) Right -> Left -> Root
d) Right -> Root -> Left

(vi) Define edge in a graph.

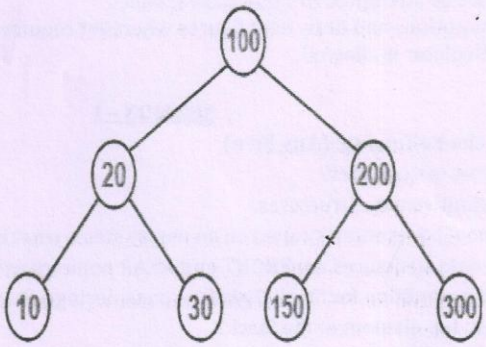
(vii) What is Full binary tree?

Q - 2 (a) Differentiate between doubly linked list and singly linked list. **[05]**

Q - 2 (b) Write an algorithm for Binary Search and show the trace with an example. **[05]**

OR

Q - 2 (a) Perform inorder, postorder and preorder traversals for the following binary tree. **[05]**



Q - 2 (b) Write the advantages of using Dynamic Memory allocation functions. **[05]**

Q - 3 (a) Write a program for Insertion sort. **[05]**

Q - 3 (b) Explain Binary Search Tree with example. **[05]**

OR

Q - 3 (a) Explain Threaded Binary Tree in detail. **[05]**

Q - 3 (b) Explain types of Graph. **[05]**

Q - 4 **Attempt any one** **[05]**

(i) Explain Adjacency Matrix and Adjacency List.

(ii) Explain five tree terminologies.

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