B.Sc - IT - Sem - 2

P P SAVANI UNIVERSITY

Second Semester of B. Sc. IT Examination

May 2019

SSIT1040 Data Structures

14.05.2019, Tuesday **Time: 12:30 p.m. To 3:00 p.m.** **Maximum Marks: 60**

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
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 the use of FRONT and REAR in queue?	
(ii)	What is non primitive data structure?	
(iii)	What is the difference between row major and column major order?	
(iv)	What do you mean by PUSH and POP?	
(v)	What is bubble sort?	
(vi)	Explain non-linear data structure.	
(vii)	Write prefix expression of the infix expression, using priority as: ( ) > $ > ^ > / > * > - > + Expression: {(A * (G * H)) / (C - D) ^ (D / E)) $ F.	
Q - 2 (a)	Write an algorithm for inserting an element in a stack and to return the value of i^{th} element from top of the stack.	**[05]**
Q - 2 (b)	Write a program to show insertion and deletion operation in a circular queue.	**[05]**
	OR	
Q - 2 (a)	Write algorithm for inserting and deleting an element in stack.	**[05]**
Q - 2 (b)	Consider the stack S with characters as shown below, where S is allocated 12 memory cells. S: H,E,L,L,O,W,O,R,L,D,_,_ Describe the stack content at the end of following operations. pop() ,push(H), push(E), pop(), push(L), push (L), pop(), push(O).	**[05]**
Q - 3 (a)	Consider the following arithmetic expression P, written in Postfix notation. Translate it in infix notation and evaluate. P: 12,7,3,-,/,2,1,5,+,*,+	**[05]**
Q - 3 (b)	Write a program to generate compact matrix from sparse matrix.	**[05]**
	OR	
Q - 3 (a)	Write a program to calculate factorial of a number.	**[05]**
Q - 3 (b)	Write an algorithm to convert an infix expression to prefix expression.	**[05]**
Q - 4	**Attempt any one.**	**[05]**
(i)	Explain the trace of bubble sort for following data. 41,29,70,19,69,55,99,31,92,84	
(ii)	Write and explain binary search algorithm with an example.	

SECTION – II

Q - 1	**Answer the following (Any Five)**	**[05]**
(i)	Define 2-3 tree.	
(ii)	Write a steps to perform preorder traversal on tree.	
(iii)	Write 'C' structure of Singly linked list.	
(iv)	Explain malloc() with its syntax.	
(v)	Define multi graph.	

(vi) Enlist the applications of linked list.

(vii) Define Adjacent nodes.

Q - 2 (a) Explain doubly linked list with an example. Enlist the advantages and drawbacks of doubly linked list. **[05]**

Q - 2 (b) Write a C program to swap n and n+1 node in singly linked list. **[05]**

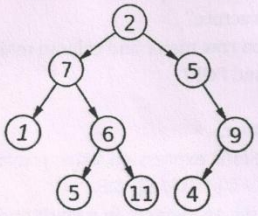
OR

Q - 2 (a) Write C program to implement INSERT_FIRST (to insert a node at the first position) and DELETE_FIRST (to delete a node from the first position) operations in circular linked list. **[05]**

Q - 2 (b) Write a C program to count total number of nodes in singly linked list. **[05]**

Q - 3 (a) Explain threaded binary tree with an example and state the advantages of it. **[05]**

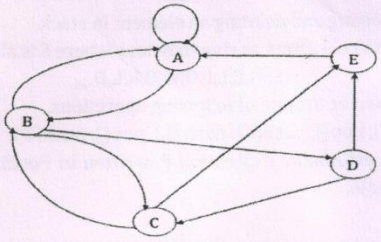
Q - 3 (b) Perform inorder, postorder and preorder traversals for the following Binary Tree. **[05]**



Explain how a general tree can be converted to binary tree.

OR

Q - 3 (a) Answer the following questions for the graph shown below: **[05]**



1. What is the outdegree of node B?
2. What is the indegree of node E?
3. Write down a path from node D to node B.
4. Is this graph is a multigraph? Give a reason for your answer.
5. What is the total degree of node A?

Q - 3 (b) Write a C program to implement push() and pop() operation of stack with linked implementation. **[05]**

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

(i) Create a Binary Search Tree for the following data and do in-order, pre-order and post-order traversal of the tree. Take 33 as root node.
53, 60, 24, 45, 33, 73, 36, 17, 56, 69, 13

(ii) Explain AVL tree with example.

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