P P SAVANI UNIVERSITY

Third Semester of B. Tech. Examination

Nov-Dec 2021

SECE2031 Data Structures

14.12.2021, Tuesday | Time: 09:00 a.m. To 11:30 a.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)	Define stack.	
(ii)	Define non-primitive data structures.	
(iii)	Draw the node of singly linked list.	
(iv)	Define Linear Search.	
(v)	Define Sorting.	
(vi)	Linked is which type of memory allocation technique?	
Q - 2 (a)	Define Stack. Write an algorithm for push and pop operation in stack.	[05]
Q - 2 (b)	Convert following expression into postfix notation. (using stack) (i) A * (B- C) /D (ii) (A + B) * C - D	[05]
	OR	
Q - 2 (a)	Explain circular queue in detail.	[05]
Q - 2 (b)	Explain row-measure and column-measure representation of sparse matrix.	[05]
Q - 3 (a)	Write an algorithm to insert elements in singly linked list at following positions: 1. at start 2. At End 3. At middle	[05]
Q - 3 (b)	Write binary search algorithm. Elaborate with an example.	[05]
	OR	
Q - 3 (a)	Differentiate between linear and non-linear data structures.	[05]
Q - 3 (b)	Explain how bubble sort works with an example.	[05]
Q - 4	Attempt any one.	[05]
(i)	Tower of Hanoi	
(ii)	Selection sort	

SECTION – II

Q - 1	Answer the Following: (Any five)	[05]
(i)	What is the maximum number of children that a node can have in a binary tree? (a) 0 (b) 1 (c) 3 (d) 2	
(ii)	Which of the following options is not true about the Binary Search tree? (a) The value of the left child should be less than the root node (b) The value of the right child should be greater than the root node. (c) The left and right sub trees should also be a binary search tree (d) None of the above	
(iii)	The number of binary trees with 3 nodes which when traversed in post order gives the sequence A, B, C is? (a) 2 (b) 3 (c) 5 (d) 4	
(iv)	The number of edges in a complete graph of 'n' vertices is (a) n (b) n(n-1)/2	

(c) n(n+1)/2 (d) None of these

(v) Which of the following ways can be used to represent a graph?
(a) Adjacency List and Adjacency Matrix
(b) Incidence Matrix
(c) Adjacency List, Adjacency Matrix as well as Incidence Matrix
(d) No way to represent

Q - 2 (a) Insert following data into binary search tree. [05]

25, 22, 18, 15, 35, 31, 50, 44, 10, 12, 4, 70, 90, 65

Give pre-order, in-order and post-order traversal of the resultant tree. Show the representation of the tree after deleting element 44.

Q - 2 (b) Write an algorithm to insert an element at the beginning of a linked list. [05]

OR

Q - 2 (a) Design the AVL tree from the following data. Insert the data in sequence in the tree. Clearly shows, all the rotation used at the time of insertion. [05]

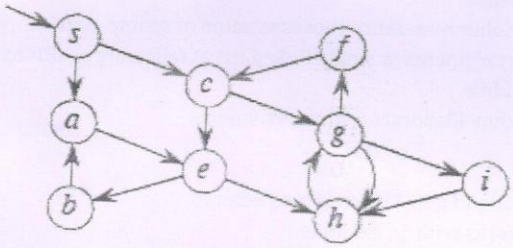
56, 9, 2, 16, 78, 32, 25, 72, 85, 42, 93

Q - 2 (b) Write an algorithm to delete an element from the end of a linked list. [05]

Q - 3 (a) The In-order and Pre-order Traversal of Graph are as below. Draw the corresponding binary tree [05]

In-order: E, A, C, K, F, H, O, B, G
Pre-order: F, A, E, K, C, O, H, G, B

Q - 3 (b) Use Depth First traversal and Breath First traversal and show the sequence of traversal for the below given graph starting from node 's'. [05]

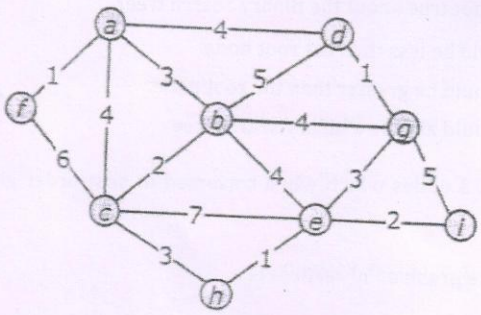


OR

Q - 3 (a) The In-order and Post-order Traversal of Graph are as below. Write the corresponding Pre-order traversal. [05]

In-order: D, B, E, F, A, G, H, C
Post-order: D, F, E, B, H, G, C, A

Q - 3 (b) Construct the Minimum Spanning Tree of given graph using Prims algorithm and show the steps. [05]



Q - 4 Attempt any one. [05]

(i) The key 12, 18, 13, 2, 3, 23, 5, 15 are inserted into an initially empty hash table of length 10 using open addressing with hash function h(k)=k mod 10 and linear probing. Show all the intermediate steps and display resultant hash table.

(ii) Write Short Notes on following

(A) Sequential file organization

(B) Random file organization

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