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Shree Damodar College of Commerce & Economics, Margao-Goa
SYB.Voc.(ST), Semester-III, Supplementary Examination June 2023
Data Structures (STG301)

Duration: 2 hrs

Max Marks: 60

Instructions:

- 1) Start each question on a fresh page.
- 2) Figures to the right indicate maximum marks.
- 3) All Questions are compulsory, however internal choice is available.

Q.1 Answer ANY 5 of the following:

5X2=10

- a) What is the advantage of Linear Search?
- b) How is sorting of numbers beneficial?
- c) What is the function of strcat in Strings?
- d) What is dynamic memory allocation?
- e) Write one advantage of a Linked List over Arrays.
- f) Write one application of a stack data structure.
- g) Define an overflow situation in a Queue.

Q.2. Answer ANY 5 of the following :

5x2=10

- a) Indicate the value of rear if the queue contains 6 elements.
- b) Discuss the initial condition to denote an empty stack.
- c) Explain the significance of a Tree Data Structure.
- d) Discuss the concept of an AVL Tree.
- e) Show an example of a Binary Tree having 4 leaf nodes.
- f) Show an example of an undirected graph having 5 vertices.
- g) Compare the Depth First Search (DFS) and Breadth First Search (BFS) method of Graph Traversals.

Q.3 Answer the following :

A) Perform Insertion Sort on the following list of unsorted numbers , to get a list of ascending numbers.

20,55,85,15,20.60

OR

(5)

B) Demonstrate the detailed process of Binary Search on the following sorted list of numbers : (Search the number 70)

10,20,30,40,55,60,70,80,90

C) Interpret the information in the given 2D Array (A[3][3]) and answer the questions below:

(5)

20	87	55
56	40	6
76	7	93

(i) What is the index of the element having value as 40?

(ii) Which row has all the numbers greater than 10?

(iii) If the above 2D array's size was A[4][6], then how many total elements can be stored in it?

Q.4. Answer the following :

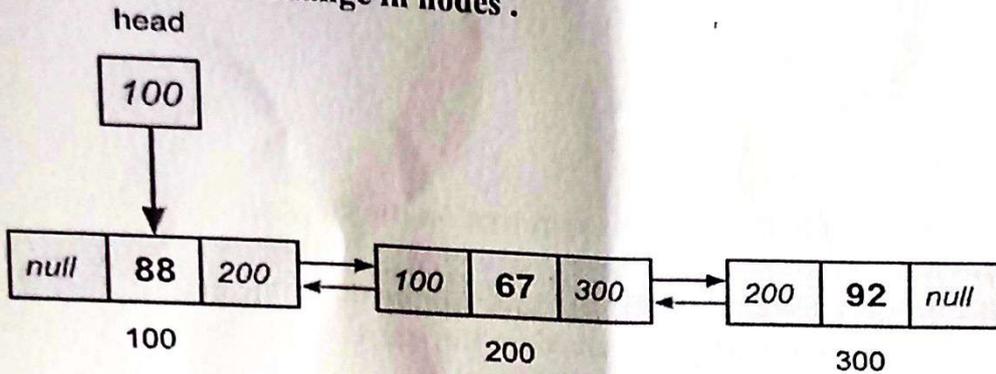
A) Illustrate any two operations on a Linked List with your own example.

OR

B) Illustrate the various parts of the Structure of a node in a doubly linked list and show one operation using your own example.

(5)

C) Perform the below mentioned Operations on the given Doubly Linked List and show the change in nodes. (5)



- (i) Perform adding a node in between the 2nd and 3rd node. (Assume the address of the new node as 600 with data as 35)
- (ii) Perform deletion of the last node and redraw the Doubly Linked List.

Q.5 Answer the following:

A) Illustrate the following sequential steps for a Queue of size 5 :

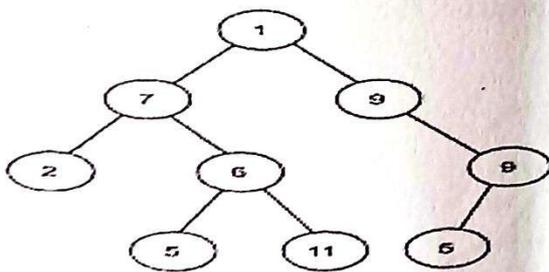
(All Steps to be shown by redrawing the Queue with labeled front and rear)

- (i) Insert 12,56,37,88 in the Queue
- (ii) Delete three elements from the Queue.
- (iii) Insert until the Queue reaches the last index.

OR

(5)

B) Identify the various labeled parts in the Tree Data structure.



- (i) Mention the names of all the non-leaf nodes in the Tree.
- (ii) Write two pairs of parent-child nodes.
- (iii) How many more nodes can make this Binary Tree as a Complete Binary Tree?

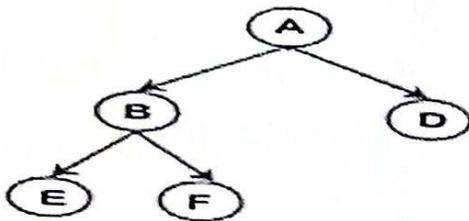
C) Interpret the given Stack of size 8 and answer the questions below: (5)

40
30
20
10

- (i) Specify the number of pop operations required on the stack to create an underflow situation.
- (ii) If the maximum size of the stack is 15, what will be the value of the Top of the stack if 8 elements are pushed on the stack.

Q.6 Answer the following:

A) Find the Balance of all the Nodes in the given Binary Tree and Perform Preorder Traversal .



OR

B) Construct a Binary Search Tree (BST) for the following numbers :
56,99,22,98,44,55,88,2,9,15

C) Interpret the given Graph (V, E) and Construct the Adjacency Matrix and find shortest path from B to D (5)

