Enroll. No._____

MARWADI UNIVERSITY

Faculty of Computer Application

M.C.A.

SEM: 1 **MU FINAL** **JANUARY: 2022**

Subject: - (Data Structure) (05MC0101) **Date:- 23/01/2023**

Total Marks:-100 **Time: - 03 Hours**

Instructions:

1. **All Questions are Compulsory.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Question: 1.

(a) Answer the following objectives [10]

1._____ operation adds an element to the top of the stack.
A) pop B) update
C) push D) all of the above

2. (A+B) is example of which of the following notation.
A) outprefix B) prefix
C) postfix D) infix

3. In _____ data structure, the data items are arranged in a linear sequence.
A) linear B) non linear
C) homogeneous D) all of above

4. A function calls itself is called _____.
A) secursion B) recursion
C) position D) none of above

5. Stack uses _____ data structure as the element that was inserted last is the first one to be taken out.
A) LIPO B) FIFO
C) LIFO D) FIPO

6. In _____ linked list it contains three parts data , next and previous.
A) singly B) super
C) singly circular D) doubly

7. If the tree is not empty, then the first node is called _____.
A) root B) internal node
C) leaf D) none of above

8. If START=_____ then it means that the singly linked list is empty and contains no nodes.
A) FULL B) NULL
C) START D) none of above

9. Each element in a tree is known as _____ of a tree.
A) root B) leaf
C) node D) none of above

10. _____ is any node with an out-degree zero.
A) root B) internal node
C) parent D) leaf

(b) Answer the following questions. [10]

1. Define: Stack
2. Define: Queue
3. Define: Linked List
4. Define: Tree
5. Define: Graph
6. Define: Algorithm
7. Define: Siblings
8. Define: Binary Tree
9. Define: Linear Search
10. Define: Isolated Node

Question: 2.

(a) List and explain categories of data structure in detail [08]

(b) List Steps of Tower of Hanoi for moving 3 Discs with diagram. [08]

OR

(b) Convert Following Infix Expression to postfix using stack. (A+B/C*(D+E)-F) [08]

Question: 3.

(a) Write an algorithm of doubly Linked List with following operation. [08]
1. Insert at Beginning
2. Delete Last Node

(b) Explain node structure of polynomial manipulation with e.g. [04]

(c) What is sparse matrix? Draw Multilinked structure of sparse matrix with example [04]

OR

(a) Write an algorithm of Singly Linked List with following operation. [08]
1. Insert a node after given node
2. Delete node at Beginning

(b) Describe Simple Queue and write algorithm of insert operation. [04]

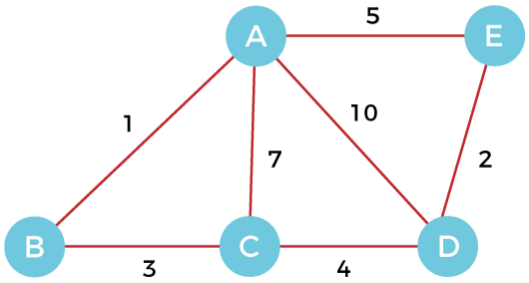
(c) Describe Stack and write algorithm of push and pop operation. [04]

Question: 4.

(a) Construct AVL tree of given elements : 3,2,1,4,5,6,7 [08]

(b) Find minimum spanning tree of following graph using Kruskal's Algorithm. [08]

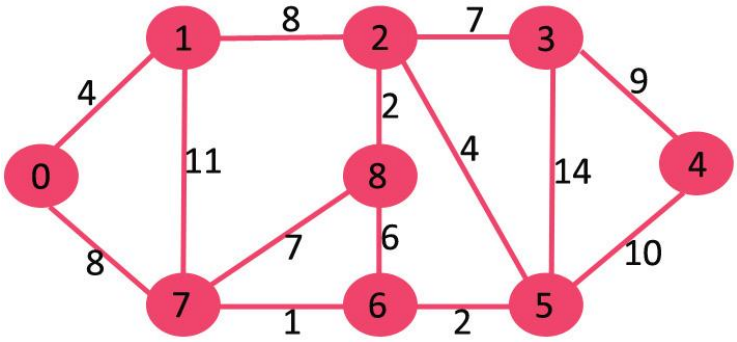
Suppose a weighted graph is -



OR

(a) Construct B-Tree Order 3 using following elements : [08]
20 30 35 85 10 55 60 25

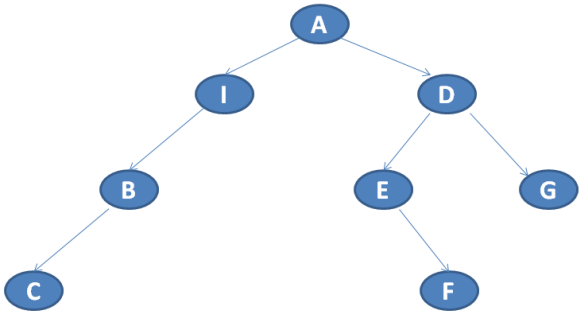
(b) Find minimum spanning tree of following graph using Prim's Algorithm. [08]



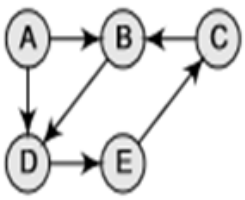
Question: 5.

(a) Draw Tree and Find Pre-order for given: [06]
In-order : D B E A F C G
Post-order : D E B F G C A

(b) Convert following binary Tree into Threaded Binary Tree. [06]



(c) Draw Adjacency matrix for following graph [04]

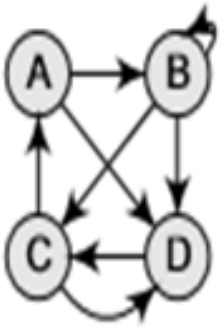


OR

(a) Differentiate BFS and DFS [06]

(b) Create Binary Search Tree of following elements. [06]
50,76,21,4,32,64,15,52,14,100,83,2,3,70,87,80

(c) Draw Adjacency List for following graph. [04]

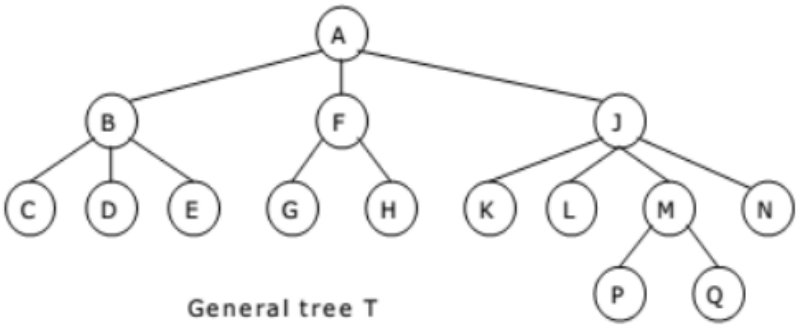


Question: 6.

(a) Sort following elements in ascending order using heapsort : (max heap) [08]
81 89 9 11 14 76 54 22

(b) Differentiate Linear search vs. Binary Search [04]

(c) Convert following general tree into threaded binary tree. [04]



General tree T

OR

(a) Sort following elements in ascending order using merge sort. [08]
12 31 25 8 32 17 40 42

(b) Sort following elements in ascending order using bubble sort. [04]
13 12 26 35 10

(c) Explain following hashing functions with example. [04]
a. Division method
b. Folding method

---Best of Luck---