Total No. of Questions : 8]

SEAT No. :

P9104

[Total No. of Pages : 4

[6179]-229

S.E. (E & TC/Electronics)

DATA STRUCTURES

(2019 Pattern) (Semester-III) (204184)

Time : 2½ Hours] *[Max. Marks : 70*

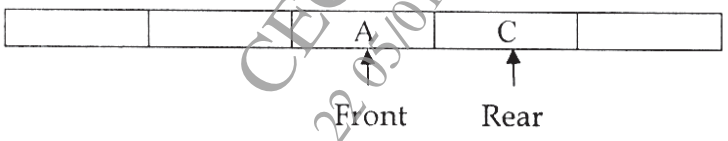
Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Write a 'C' function to Push and POP elements from a stack of characters using an array. **[6]**

b) Convert the following infix expression to postfix using stack (show all the steps properly): a+b*(c/d$a)/b **[5]**

c) Consider following circular queue of characters and size 5. **[6]**



Front point to A and Rear Points to C. Show the circular queue contents as per the following operations at every step.

i) F is added to the queue.

ii) Two letters are deleted.

iii) K, L, M are added to the queue

iv) Two letters are deleted.

v) R is added to the queue.

vi) Two letters are deleted.

OR

P.T.O.

Q2) a) Compare Stack and Queue. **[4]**

b) What are the applications of Stack. Represent stack for decimal to binary conversion:$(56)_{10}$ to $(---)_2$ **[3]**

c) Define Queue. What are conditions for 'Queue empty' and 'Queue full' when queue is implemented using Array? Explain. **[6]**

d) Write a 'C' function for deletion in a queue using an array. **[4]**

Q3) a) Compare circular linked list with singly linked in terms of pros and cons. **[6]**

b) What is a singly linked list? Write C function for inserting a node at a given location into a singly linked list. **[6]**

c) Explain the disadvantages of polynomial representation using an array. Represent the following polynomial using a singly linked list. **[6]**

$23x^9 + 18x^7 + 41x^6 + 16x^4 + 3$

OR

Q4) a) What is a doubly linked list? Write a 'C' function for Inserting a number at the end of the doubly linked list. **[6]**

b) Write a 'C' function for Inserting a number at the front of the circular linked list. **[5]**

c) Compare linked representation and array representation with reference to the following aspects: **[3]**

i) Accessing any element randomly

ii) Insertion & deletion of an element

iii) Utilization of memory.

d) Write a short note on the Circular Linked list. **[4]**

Q5) a) Define the following terms with respect to Trees: **[5]**

i) Root

ii) Subtree

iii) Level of node

iv) Depth of Tree

v) Siblings

b) Write a recursive 'C' function for inorder, preorder, postorder traversal? **[6]**

c) Construct the Binary Search Tree (BST) from the following data:

5,2,8,4,1,9,7

Also show preorder, postorder and inorder traversal for the same. **[6]**

OR

Q6) a) Define a tree. Explain with a suitable example how a binary tree can be represented using an array. **[5]**

b) Write an algorithm to implement non-recursive in-order traversal of binary search tree. **[6]**

c) The postorder and inorder traversal of a binary tree are given below. Is it possible to obtain a unique binary tree from these traversals? If yes, obtain the tree, if not give justification. **[6]**

Inorder Traversal : D B F E G A H I C

Postorder Traversal : D F G E B I H C A

Q7) a) Define Graph. Explain types of Graph. **[6]**

b) Compare DFS and BFS. **[6]**

c) Find the minimal spanning tree of the following graph using Prim's algorithm. Show all the steps. **[6]**

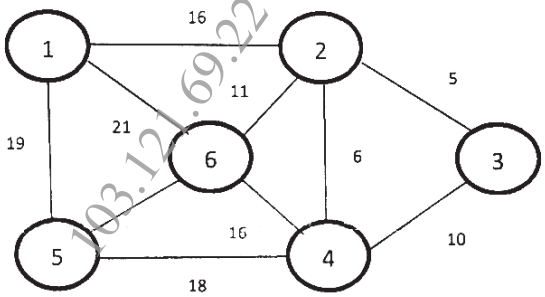


Fig. 1

OR

Q8) a) Define with an example: **[6]**

i) Path

ii) Cycle

iii) Connected graph

b) Define indegree and outdegree of a vertex in graph. Find the indegree and outdegree of following graph. **[6]**

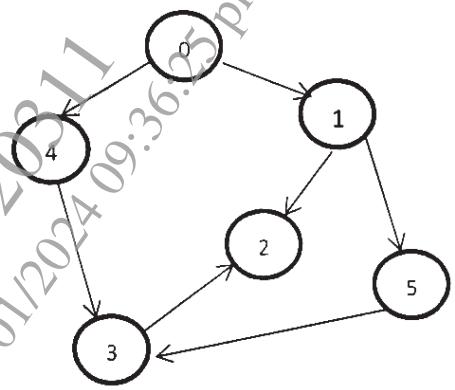


Fig 2

c) Represent the following graph using the adjacency matrix and adjacency list. **[6]**

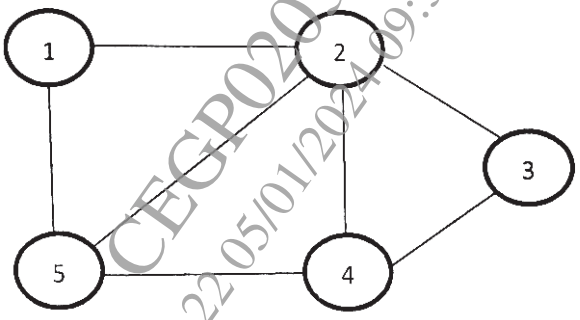


Fig. 3

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