University of Mumbai

Examinations Summer 2022

Time: 2 hour 30 minutes Max. Marks: 80

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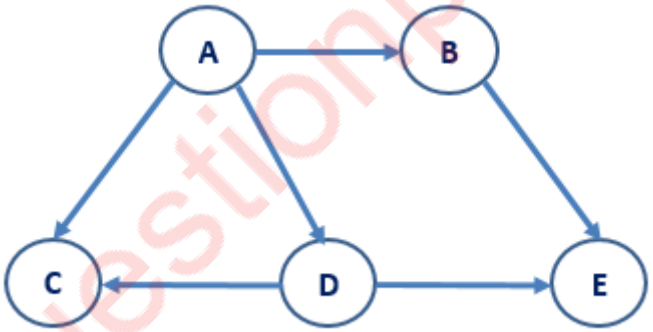
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**

1.	Consider the following definition in c programming language. Which of the following c code is used to create a new node of circular linked list?
	`struct node`
	`{`
	`int data;`
	`struct node *next;`
	`}`
	`typedef struct node NODE;`
	`NODE *ptr;`

Option A:	ptr = (NODE*)malloc(NODE);
Option B:	ptr = (NODE*)malloc(sizeof(NODE*));
Option C:	ptr = (NODE)malloc(sizeof(NODE));
Option D:	ptr = (NODE*)malloc(sizeof(NODE));
2.	Binary search can be performed, if data items are stored in an
Option A:	Unordered array
Option B:	Ordered array
Option C:	Unordered linked list
Option D:	Ordered linked list
3.	The equivalent postfix expression corresponding to the infix expression (A+B)*(D/C) is
Option A:	ABDC/*+
Option B:	AB+D*C/
Option C:	AB+DC/*
Option D:	ABD*+C/
4.	In the Breadth-First Search traversal of a graph, how many times does a node get visited?
Option A:	Once
Option B:	Twice
Option C:	Equivalent to number of indegree of the node
Option D:	Equivalent to number of outdegree of the node
5.	Linked lists are preferred to other data structures when
Option A:	The elements are in ascending or descending order.
Option B:	No deletion of elements needs to be performed.
Option C:	The number of elements in the list is known beforehand.
Option D:	Insertions and deletions are frequent in a list of unknown sizes.
6.	The number of null links in a binary tree with n nodes is
Option A:	n-1
Option B:	2n – 1
Option C:	2n
Option D:	n + 1
7.	In an AVL tree, difference of height in left sub-tree and right-tree for every node is _____.
Option A:	Zero

Option B:	One
Option C:	Atmost one
Option D:	Atleast one
8.	Suppose a queue is implemented by a circular array QUEUE[0…9]. The number of elements in the queue, if FRONT = 8 and REAR = 3, will be
Option A:	3
Option B:	4
Option C:	5
Option D:	6
9.	_____ is used in implementation of recursion.
Option A:	Array
Option B:	Stack
Option C:	Queue
Option D:	Tree
10.	In an almost complete binary tree with 13 nodes, the number of leaves will be
Option A:	5
Option B:	6
Option C:	7
Option D:	8

Q2	**Solve any Four out of Six** **5 marks each**
A	Explain different operations that can be performed on data structures.
B	Write a function to delete the last node of the circular linked list.
C	Show the steps for finding the topological sorting of the below graph. 
D	Write an algorithm to evaluate a postfix expression.
E	Write short note on Priority Queue.
F	Construct Binary Search Tree for the following list of elements 45 28 34 63 87 76 31 11 50 17

Q3	**Solve any Two Questions out of Three** **10 marks each**
A	Show the result of inserting 16, 18, 5, 19, 11, 10, 13, 21, 8, 14 one at a time into an initially empty AVL tree.
B	A hash table of size 10 uses linear probing to resolve collisions. The key values are integers and the hash function used is key%10. Draw the table that results after inserting in the given order the following values: 28, 55, 71, 38, 67, 11, 10, 90, 44, 9
C	Write a program to implement Circular queue using an array.

Q4	**Solve any Two Questions out of Three** **10 marks each**
A	Write a program to convert the given decimal number to a binary number using stack data structure.
B	Write a program to perform the following operations on a singly linked list i. Insert a new node at the end of the list ii. Delete a node from the beginning of the list iii. Search for a given node iv. Display the list
C	Construct an expression tree for the expression (a + b / c) + ((d * e + f) / g). Give the outputs when you apply preorder and postorder traversals.