

# **University of Mumbai**

**Program: Cyber Security**

**Curriculum Scheme: Rev2019**

**Examination: SE Semester :III**

**Course Code: CSC303**

**Course Name: Data Structure**

**Time: 2 hour 30 minutes**

**Max. Marks: 80**

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<b>Q1.</b>	<b>Choose the correct option for following questions. All the Questions are compulsory and carry equal marks</b>
1.	Topological sort can be implemented on a?
Option A:	Linked list
Option B:	Binary tree
Option C:	Directed acyclic graph
Option D:	Directed cyclic graph
2.	Postfix expression corresponding to the infix expression “(1+ 4) / (8 - 6) * 3” is
Option A:	1 4 / 8 6 * 3 -
Option B:	14 / 8 6 * - 3 +
Option C:	1 4 + 8 6 / - * 3
Option D:	1 4 + 8 6 - / 3 *
3.	Which of the following trait of a hash function is most desirable?
Option A:	It should be easy to implement
Option B:	It should occupy less space
Option C:	It should cause less collisions
Option D:	It should cause more collisions
4.	Which of the following statement is not true about the doubly linked list?
Option A:	We can traverse in both the directions.
Option B:	It requires extra space
Option C:	Implementation of doubly linked list is easier than the singly linked list
Option D:	It stores the addresses of the next and the previous node
5.	B+ tree can contain a maximum of 7 pointers in a node. What is the minimum number of keys in leaves?
Option A:	3
Option B:	4
Option C:	5
Option D:	6
6.	Assume a binary search tree created by inserting the values 27, 9, 23, 22, 29, 25, 15, 50, 95, 60, 40. Number of nodes in the right subtree will be
Option A:	4
Option B:	5
Option C:	6

Option D:	7
7.	Which of the following is essential for evaluating a postfix expression?
Option A:	An operator stack
Option B:	An operand stack
Option C:	An operator stack and an operand stack
Option D:	A parse tree
8.	Stacks cannot be used to
Option A:	evaluate an arithmetic expression in postfix form
Option B:	implement recursion
Option C:	convert a given arithmetic expression in infix form to its equivalent postfix form
Option D:	allocates resources (like CPU) by the operating system
9.	Queue data structure is used for -
Option A:	Preorder traversal in tree
Option B:	Postorder traversal in tree
Option C:	Depth first traversal in graph
Option D:	Breadth first traversal in graph
10.	The operation of processing each element in the list is known as
Option A:	Creation
Option B:	Insertion
Option C:	Deletion
Option D:	Traversal

<b>Q2</b>	<b>Solve any Two Questions out of Three</b>	<b>10 marks each</b>
A	Write a C program for Singly Linked list for performing following operations i. Create SLL ii. Display SLL iii. Delete last node from SLL iv. Insert a node at start of SLL	
B	Draw the B-tree of order 4 created by inserting the following data arriving in sequence: 25,10,16,32,20,5,27,39,7,11.	
C	Define recursion. Differentiate between iteration and recursion. Write a C program to check whether a string is palindrome or not, with the help of stack data structure.	

<b>Q3.</b>	<b>Solve any Four Questions out of Six</b>	<b>5 marks each</b>
A	Define ADT. Write ADT for stack.	
B	Consider a hash table with size = 7. Using Linear probing, insert the keys 99,33,23, 44, 56,43,19 into the table	
C	Write an algorithm to check the well-formedness of parenthesis in an algebraic expression using Stack data structure.	
D	Write a C functions to implement insertion and deletion in queue using linked list	
E	Explain deletion of a node in a binary search tree	

F	Create a Binary Search Tree for the following sequence and write all the 3 traversal sequences from resultant BST: 45,39,56,12,34,78,32,10,89,54,67,81.
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<b>Q4.</b>	
A	<b>Solve any Two</b> <span style="float: right;"><b>5 marks each</b></span>
i.	Define circular queue. Assume a circular queue with a capacity 6, currently having the elements 50 and 70 at locations 2 and 3 respectively. Show with example, the queue full and queue empty conditions by performing necessary operations on circular queue.
ii.	An array contains the elements – 8,13,17,26,44,56,88,97. Using binary search algorithm, trace the steps followed to find numbers 56 & 9 . At each step, show the contents of low, high & mid and array after each iteration
iii.	Create a Binary Search Tree for the following sequence and write all the 3 traversal sequences from resultant BST: 45,39,56,12,34,78,32,10,89,54,67,81.
B	<b>Solve any One</b> <span style="float: right;"><b>10 marks each</b></span>
i.	Create a AVL tree for the sequence: I, N, F, O, R, M, A, T, G. Consider the characters to arrange in alphabetic sequence. Show the tree after each insertion with balance factors.
ii.	Write an algorithm/pseudocode to convert a given infix expression to postfix expression? Trace the steps involved in converting the given infix expression $((A +B)^C)-((D*C)/F)$ to postfix expression