

UOM Exam Second half 2021_Question paper_R2019/CSC303 - Data Structure /Sem-III / COMPUTER ENGINEERING / ARTIFICIAL INTELLIGENCE AND DATA SCIENCE / ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING / COMPUTER SCIENCE AND ENGINEERING (Artificial Intelligence and Machine Learning / COMPUTER SCIENCE AND ENGINEERING (Data Science) / COMPUTER SCIENCE AND ENGINEERING (Internet of Things and Cyber Security Including Block Chain Technology) / CYBER SECURITY / DATA ENGINEERING / INTERNET OF THINGS (IoT)

Dear Student,

Please note before you attempt this section of examination:

1. Q1, Q2, Q3 and Q4 carry 20 marks each.
2. This paper contains 20 Marks MCQ and 60 marks subjective section for 150 minutes duration.
3. It is mandatory for all the students to upload their answer papers in a single PDF format only.
4. You have to write Date of Examination, Seat number, Program, Scheme and semester, Subject name, Signature on EVERY PAGE.
5. Remain in the meet with your camera on and you in clear view throughout the duration of the exam.

* Required

1. Email *

2. Student Name (As per exam form filled) *

3. Seat No *

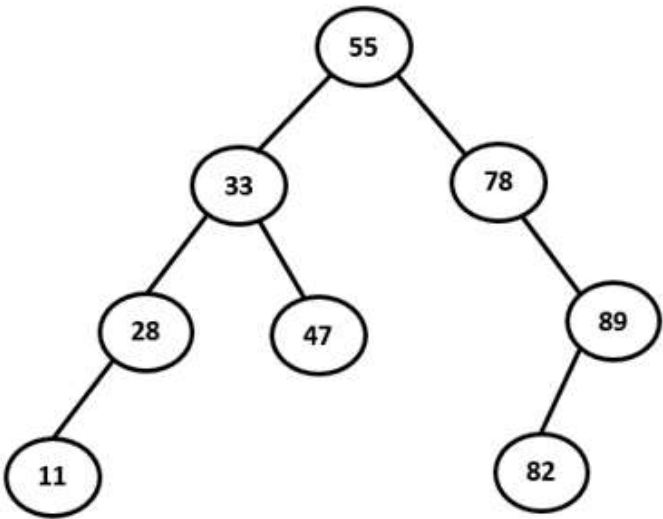
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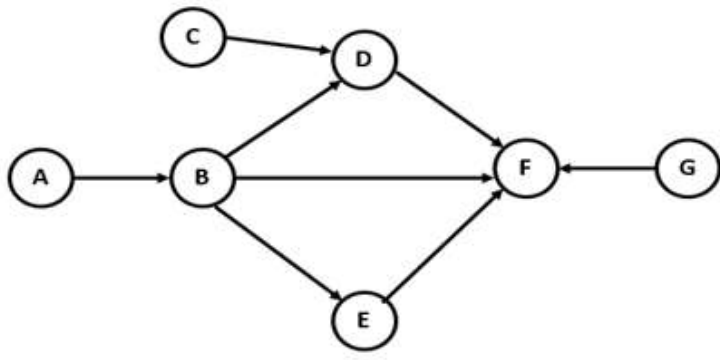
Solve Questions as per the
instructions given separately.

- Please upload a single PDF for Q1 to Q4
- For MCQs Question write Question number & correct option with complete text in option.
- Q2 to Q4 are subjective questions - Solve Questions as per the instructions and marks allotted.

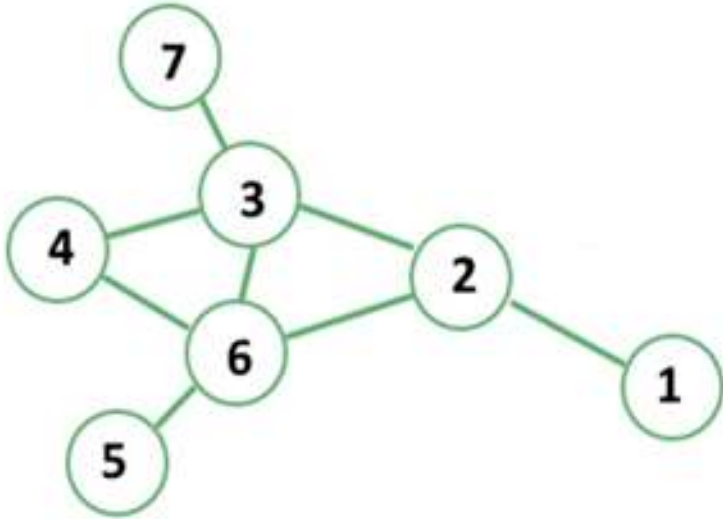
Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	The postfix form of the infix expression $A + B * C / D - E + F$ is
Option A:	ABCD*/+EF+-
Option B:	ABC*D/+E-F+
Option C:	ABC*D/EF-++
Option D:	ABCD*/EF++-
2.	If pointer p is pointing to the last node of the doubly linked list and insertLast () function is called to insert a newNode in the list then which statement needs to be executed.
Option A:	p→next=newNode; newNode→prev=p; newNode→next=NULL; p=newNode;
Option B:	newNode→prev=p; p→next=newNode; p→prev=NULL; newNode=p;
Option C:	p→prev=newNode; newNode→next=p; p=newNode; newNode→prev=NULL;
Option D:	newNode→next=p; p→next=newNode; newNode→prev=NULL; newNode=p;
3.	Given the following input (22, 34, 11, 68, 88, 41, 73, 98) and the hash function $x \bmod 10$, which of the following statements are true? i) All elements hash to the same value ii) 11, 41 hash to the same value iii) 68, 88, 98 hash to the same value iv) Each element hashes to a different value
Option A:	ii only
Option B:	iii only
Option C:	ii and iii
Option D:	i or iv
4.	Consider the Binary Search Tree given below and find the result of post-order traversal sequence
<pre> graph TD 7((7)) --- 5((5)) 7 --- 12((12)) 5 --- 3((3)) 5 --- 6((6)) 3 --- 1((1)) 3 --- 4((4)) 12 --- 9((9)) 12 --- 15((15)) 9 --- 8((8)) 9 --- 10((10)) 15 --- 13((13)) 15 --- 17((17)) </pre>	
Option A:	1 3 4 5 6 7 8 9 10 12 13 15 17
Option B:	1 4 3 6 5 8 10 9 13 17 15 12 7
Option C:	4 1 3 5 6 10 8 9 12 17 13 15 7
Option D:	17 13 15 10 8 9 12 6 4 1 3 5 7

5.	Which of the following are the applications of Queue? i. Resource shared by multiple users ii. Call Centre phone systems iii. Recursion iv. Data transfer asynchronously among client and server
Option A:	ii, iii
Option B:	i, ii, iii
Option C:	i, ii, iv
Option D:	i, iii, iv
6.	In a list of 150 elements if we wish to access the 79th element of list then _____ data structure will require less time to access the element.
Option A:	Stack
Option B:	Queue
Option C:	Linked List
Option D:	Array
7.	For Linked List 10->20->30->40->50, What does the following function print with first node as head? <pre>void fun1(struct node* head) { if(head == NULL) return; fun1(head->next->next); printf("%d ", head->data); }</pre>
Option A:	10->20->30->40->50
Option B:	50->40->30->20->10
Option C:	10->30->50
Option D:	50->30->10
8.	If binary trees are represented in arrays, what formula can be used to locate a right child, if the node has an index i ? (Assume array indexing starts with 0)
Option A:	$2i-1$
Option B:	$2i+1$
Option C:	$2i+2$
Option D:	$2i-2$

9.	What are the number of edges present in a complete graph having n vertices?
Option A:	$(n+1)/2$
Option B:	$(n-1)/2$
Option C:	$(n*(n-1))/2$
Option D:	$(n*(n+1))/2$
10.	What is the balance factor of the node 78 in the given tree?
 <pre> graph TD 55((55)) --> 33((33)) 55 --> 78((78)) 33 --> 28((28)) 33 --> 47((47)) 28 --> 11((11)) 78 --> 89((89)) 89 --> 82((82)) </pre>	
Option A:	1
Option B:	-1
Option C:	2
Option D:	-2

Q2 (20 Marks)	Solve any Four out of Six	5 marks each
A	Explain Linear and Non-linear data structures with an example.	
B	Write a C function for insertion of a node to the immediate right of the Key node in a doubly linked list.	
C	Write a program to reverse a string using stack.	
D	Why Circular queue is better than Linear Queue. Justify your answer with proper example.	
E	Consider the given directed acyclic graph. Sort the nodes by applying topological sort on the graph. 	
F	Create an expression tree for the following expressions. i) $A + B * C/D - E$ ii) $(3x+5)(6x-4)$	

Q3 (20 Marks)	Solve any Two Questions out of Three	10 marks each
A	Consider a list that stores information about Employees where each node contains Employee Id, Employee Name and Salary. Write a C program to perform following operations on singly linked list: i) Create a singly linked list by inserting nodes at the beginning ii) Delete all nodes whose salary matches the given salary	
B	Write a program in C to evaluate a given postfix expression. Show the simulation using stack for the following expression: $6\ 4\ 2 + 5 * + 8 -$	
C	How does the AVL tree differ from Binary Search Tree? Show the result of inserting 15, 19, 22, 10, 3, 37, 25, 12, 13 one at a time into an initially empty AVL Tree.	

Q4 (20 Marks)	
A	Solve any Two 5 marks each
i.	Write a program to add the values of the nodes of a linked list, Calculate the mean and display the result.
ii.	For the following graph, Show all the steps of the Depth First Search traversal starting with vertex 1.  <pre> graph LR 1 --- 2 2 --- 3 2 --- 6 3 --- 4 3 --- 6 4 --- 6 6 --- 5 7 --- 3 </pre>
iii.	Write functions Insert_Front and Delete_Rear to insert and delete element from Double Ended Queue using array.
B	Solve any One 10 marks each
i.	Using Linear Probing and modulo division method, hash the following elements into a table of size 11. 45, 8, 33, 85, 61, 10, 48, 76, 59
ii.	Create a B tree of order 3 for the following data arriving in sequence: 90, 27, 7, 9, 18, 21, 3, 16, 11