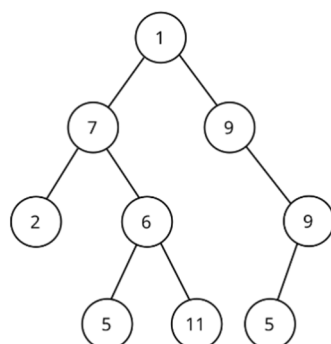


[4]

- Q.6 i. Define a graph. Explain the difference between a directed and an undirected graph and give an example of each. **4** 1 2 2 1
- ii. Give inorder, preorder and postorder traversal of the given tree- **6** 3 1 3 3



- OR iii. What is an AVL tree? Describe the concept of balancing in AVL trees and its importance. **6** 3 1 3 3

Total No. of Questions: 6

Total No. of Printed Pages:4

Enrollment No.....



Faculty of Engineering / Science

End Sem Examination Dec 2024

CS3CO31 / BC3CO36 Data Structures

Programme: B.Tech./B.Sc.

Branch/Specialisation: CSE All/

Computer Science

Duration: 3 Hrs.

Maximum Marks: 60

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

		Marks	BL	PO	CO	PSO
Q.1 i.	Which of the following supports memory addresses and direct access to elements?	1	1	2	2	1
	(a) Linked list (b) Array (c) Queue (d) Tree					
ii.	In a multidimensional array, if the base address is 1000 and each element requires 4 bytes, what is the address of the element in the second row, 2 nd column in a 2D array? Assume array of size A[2][2].	1	1	2	2	1
	(a) 1008 (b) 1012 (c) 1016 (d) 1020					
iii.	Suppose a singly linked list is used to store integers. If the address of the first node is p, and each node has an integer field data and a pointer next, which of the following code snippets correctly reverses the list?	1	1	4	4	2
	(a) while (p != NULL) { temp = p->next; p->next = NULL; p = temp; } (b) while (p != NULL) { temp = p->next; p->next = prev; prev = p; p = temp; } (c) while (p != NULL) { prev = p; p = p->next; p->next = prev; } (d) while (p != NULL) { p = p->next; prev = p->next; }					

[2]					
iv.	Which of the following operations is NOT supported by a singly linked list?	1	1	2	1 1
	(a) Forward traversal				
	(b) Insertion at the beginning				
	(c) Backward traversal				
	(d) Deletion from the middle				
v.	Consider an array-based implementation of a stack with a maximum size of N. If the stack currently contains k elements (where $k < N$), which of the following statements correctly describes the condition to detect an overflow and underflow, respectively?	1	1	1	3 3
	(a) Overflow: $\text{top} == N - 1$, Underflow: $\text{top} == -1$				
	(b) Overflow: $\text{top} == N$, Underflow: $\text{top} == 0$				
	(c) Overflow: $\text{top} == N + 1$, Underflow: $\text{top} == -1$				
	(d) Overflow: $\text{top} > N - 1$, Underflow: $\text{top} == 1$				
vi.	Which data structure is best suited for implementing recursion?	1	1	2	2 1
	(a) Queue (b) Array				
	(c) Stack (d) Linked list				
vii.	Which of the following is a comparison-based sorting algorithm?	1	1	2	1 1
	(a) Bubble sort (b) Counting sort				
	(c) Radix sort (d) Bucket sort				
viii.	Which of the following is used to resolve hash collisions?	1	1	2	2 1
	(a) Stack (b) Priority queue				
	(c) Chaining (d) Linear search				
ix.	Which traversal method visits the left subtree, then the root, and finally the right subtree?	1	1	2	2 1
	(a) Preorder (b) Postorder				
	(c) Inorder (d) Level order				
x.	A binary tree in which every level, except possibly the last, is completely filled, and all nodes are as left as possible, is called:	1	1	2	1 1
	(a) AVL tree				
	(b) Complete binary tree				
	(c) Full binary tree				
	(d) Threaded binary tree				

[3]					
Q.2	i.	Define data structures. Differentiate between linear and non-linear data structures with examples.	4	1,4	2 1 1
	ii.	Write a program to reverse the content of an array in any programming language. Don't use any inbuilt library to reverse the content.	6	3	4 4 2
OR	iii.	Write a program to insert an element in an array.	6	3	4 4 2
Q.3	i.	Explain the structure and working of a doubly linked list. How does it differ from a singly linked list?	4	2	2 2 1
	ii.	Write functions in any language for following operations in a singly linked list: insertion at the end, deletion from the beginning, and display of the list. Don't write complete program to create the linked list, just write asked functions.	6	3	4 4 2
OR	iii.	Write functions in any language for following operations in a singly linked list: insertion at the beginning, deletion at the end, and printing total number of elements in the linked list. Don't write complete program to create the linked list, just write asked functions.	6	3	4 4 2
Q.4	i.	How circular queue is better than simple queue? Explain with example.	4	2	2 2 1
	ii.	Convert the following infix expression into postfix expression using stack: $A+B^{\wedge}C^{\wedge}D/E/F$	6	2	1 3 3
OR	iii.	Evaluate the prefix expression using stack: $* + 5 6 - 4 2$	6	3	1 3 3
Q.5	i.	Differentiate between linear search and binary search. Which scenarios are best suited for each?	4	4	2 2 1
	ii.	Explain bubble sort algorithm. Write each and every step of sorting the following list: 12, 18, 6, 27, 2, 16, 7.	6	2	1 3 3
OR	iii.	Explain quick sort algorithm with proper example.	6	2	1 3 3

Marking Scheme
CS3CO31-BC3CO36 Data Structures

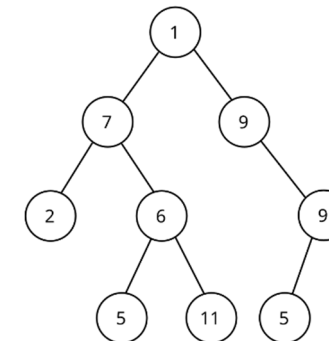
Q.1	i)	(b) Array	1
	ii)	(b) 1012	1
	iii)	(b) while (p != NULL) { temp = p->next; p->next = prev; prev = p; p = temp; }	1
	iv)	(c) Backward traversal	1
	v)	(a) Overflow: top == N - 1, Underflow: top == -1	1
	vi)	(c) Stack	1
	vii)	(a) Bubble Sort	1
	viii)	(c) Chaining	1
	ix)	(c) Inorder	1
	x)	(b) Complete Binary Tree	1
Q.2	i.	Define data structures 2M Differentiate between linear and non-linear data structures with examples. 2M	4
	ii.	Write a program to reverse the content of an array in any programming language. Don't use any inbuilt library to reverse the content.	6
OR	iii.	Write a program to insert an element in an array.	6
Q.3	i.	Explain the structure 1M working of a doubly linked list. 1M How does it differ from a singly linked list? 2M	4
	ii.	insertion at the end 2M deletion from the beginning 2M display of the list. 2M	6
	iii.	insertion at the beginning 2M deletion at the end 2M printing total number of elements in the linked 2M	6
Q.4	i.	How circular queue is better than simple queue 2M Explain with example. 2M	4
	ii.	Convert the following infix expression into postfix expression using stack:	6

OR iii. $A+B^C^D/E/F$
Evaluate the prefix expression using stack: 6
 $* + 5 6 - 4 2 = 22$

Q.5 i. Differentiate between linear search and binary search. 2M 4
Which scenarios are best suited for each? 2M
ii. Explain bubble sort algorithm. 2M 6
Write each and every step of sorting the following list: 4M
12, 18, 6, 27, 2, 16, 7

OR iii. Explain quick sort algorithm 3M 6
with proper example. 3M

Q.6 i. Define a graph. 2M 4
Explain the difference between a directed 1M
an undirected graph and give an example of each. 1M
ii. 6



Give inorder 2M
preorder 2M
postorder traversal of the given tree. 2M
OR iii. What is an AVL tree 2M 6
Describe the concept of balancing in AVL trees 2M
and its importance. 2M
