KIIT Deemed to be University
Online End Semester Examination(Spring Semester-2021)

Subject Name & Code: Data Structure Using C (CS-3040)
Applicable to Courses: B.Tech

Full Marks=50 **Time:2 Hours**

SECTION-A(Answer All Questions. Each question carries 2 Marks)

Time:30 Minutes **(7×2=14 Marks)**

Question No	Question Type(MCQ/SAT)	Question	CO Mapping	Answer Key (For MCQ Questions only)

Q.No:1	MCQ	What will be the output of the following program?
		#include <stdio.h>
		int i=0;
		int main()
		{
		int arr[]={1,0,2,0,3,0,4,0};
		int i = 1;
		for(i = 0; i<3;i++)
		arr[i] = arr[i+1];
		printf("%d",arr[i]);
		return 0;
		}
		a)0
		b)3
		c)2
		d)1
			1	a

	MCQ	What will be the output of the following program?
		#include <stdio.h>
		int i=0;
		int main()
		{
		int arr[]={1,0,2,0,3,0,4,0};
		int i = 1;
		for(i = 0; i<3;i++)
		arr[i+1] = arr[i];
		printf("%d\t%d",arr[i],arr[i+1]);
		return 0;
		}
			1	d

		a)1 0 b)2 0 c)0 3 d)1 3		

	MCQ	What will be the output of the following program?
		#include <stdio.h>
		int i=0;
		int main()
		{
		int arr[]={1,0,2,0,3,0,4,0};
		int i = 1;
		for(i = 1; i<4;i++)
		arr[i-1] = arr[i+1];
		printf("%d\t%d",arr[i-1],arr[i]);
		return 0;
		}
		a)0 2
		b)0 3
		c)0 0
		d)3 0
			1	b

	MCQ	What will be the output of the following program?
		#include <stdio.h>
		int i=0;
		int main()
		{
		int arr[]={1,0,2,1,3,1,4,0};
		int i = 1;
		for(i = 2; i<6;i++)
		arr[i-1] = arr[i+1];
		printf("%d\t%d",arr[i-1],arr[4]);
		return 0;
		}
		a)2 3
		b)1 2
		c)1 4
		d)1 3
			1	c

Q.No:2	**MCQ**	In a double circular linked list what the following code will print? head->prev->next->data a)data of header node b)data of last node c)data of next node pointed by header node d)data of last but one's node	2	a
	MCQ	In a double circular linked list what the following code will print?	2	c

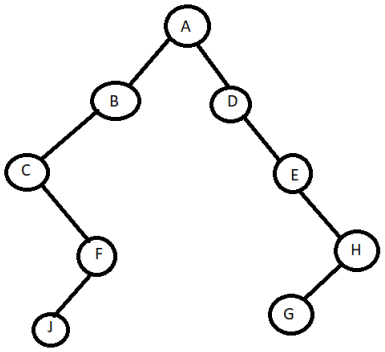
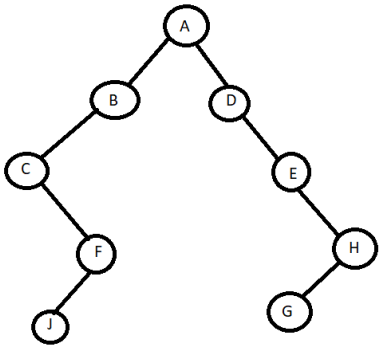
		head->next->prev->prev->data a)header node's data b) data of second node pointed by header node c)last nodes data d)data of previous node pointed by last node		

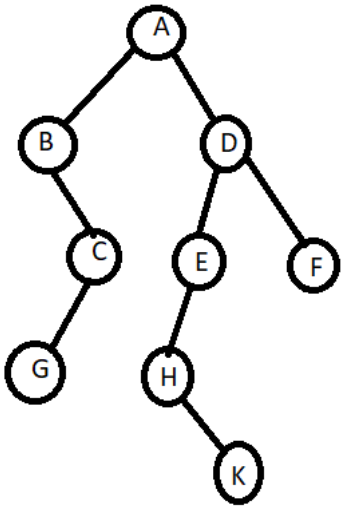
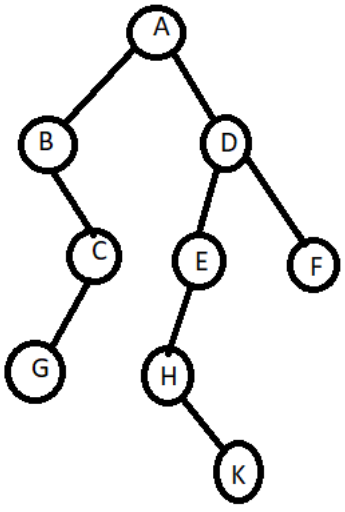
	MCQ	What will happen by executing the following code in a double circular link list having more than two nodes?
		
		head->prev=head->prev->prev->next;
		
		head->next->prev=head->prev->next;
		
		a)second node becomes header node
		b)last but one node becomes last node
		c)header node's previous points to last but one node
		d)no change
			2	d

	MCQ	How the second node's data will be printed after executing the following code in a double circular link list having more than two nodes? head->prev->next->next=head->prev; a)head->next->data b)head->prev->prev->data c)head->next->next->data d)head->data	2	b
Q.No:3	**MCQ**	Which of the following data structure is mainly used for recursive algorithm? a)Stack b)Queue c)Linked list d)BST	3	a
	MCQ	Where an element is inserted in the queue using link list? a)At the header node	3	b

		b)at the last of the node c)at the middle d)none of the above		

	MCQ	Using single linked list,which of the following makes a new node pointed by "ptr" gets inserted to stack?
		
		a)top = ptr; ptr->next = top;
		b)top = ptr; ptr=ptr->next
		c)ptr = top; ptr->next = top;
		d)ptr->next=top; top = ptr;
			3	d

	MCQ	The CPU task scheduling is performed using which of the following? a)stack b)queue c)linked list d)array	3	b
Q.No:4	**MCQ**	What will be the in order traversal of the following binary tree?  a)CJFBADEGH b)ABCFJDEHG c)CFJBADEGH d)ABDCEFHJG	4	a
	MCQ	What will be the post order traversal of the following binary tree?  	4	c

		a)CJFBADEGH b)ABCFJDEHG c)JFCBGHEDA d)ABDCEFHJG		
	MCQ	What will be the in order traversal of the following binary tree?  a)GCBKHEFDA b)BGCAHKEDF c)ABCGDEHKF d)ABDCEFGHK	4	b
	MCQ	What will be the post order traversal of the following binary tree?  a)BGCAHKEDF b)ABCGDEHKF c)ABDCEFGHK d)GCBKHEFDA	4	d
Q.No:5	**MCQ**	In a circular queue implemented in an array,	3	a

		if(rear+1)%MAX)==front then a) overflow condition b) Underflow condition c) Successful insertion possible d) Array list is blank		
	MCQ	Which of the following condition is justifying the overflow condition of a circular queue implemented using an array? a)(front+1)%MAX)==rear b)(rear+1)%MAX)==front c)rear==MAX d)front == -1	3	b
	MCQ	Which of the following is TRUE? a) In an output restricted queue, the input is not allowed from front end. b) In a circular queue implemented using an array, when the rear reaches the MAX then overflow condition is achieved. c) In an input restricted queue,the deletion can happen from front. d) Queue works In Last in First out principle.	3	c
	MCQ	Which of the following is not TRUE? a) Stack uses Last In First Out principle. b) The stack implemented using array reaches overflow condition when top= MAX -1; c) The deletion of an element in a stack can happen only from top. d)Backtracking algorithm is not possible using stack.	3	d
Q.No:6	**MCQ**	Which of the following can be the worst case time complexity of searching a node in a Binary search Tree? a) O(n) b) O(log n)	4	a

		c) O(n/2) d) $O(n^2)$		
	MCQ	Which of the following can be the worst case time complexity of searching a node in a Binary Tree? a)O(log n) b)O(n/2) c)O(n) d)$O(n^2)$	4	c
	MCQ	Which of the following is not correct? a) AVL tree is a balanced tree. b)The height of a binary tree is the longest path from leaf node to the root. c)The depth of a node in a binary tree is the total number of edges from the node to root node. d) In an in-order tree traversal the algorithm, nodes are visited as left-root-right.	4	b
	MCQ	Which of the following can be the worst case time complexity of searching a node in an AVL Tree? a)$O(n^2)$ b)O(n/2) c)$O(\log_2 n)$ d)O(n)	4	c
Q.No:7	**MCQ**	Which of the following is not correct? a)A binary search algorithm can be applied on a list of items sorted in descending order. b)A linear search algorithm can have O(n) as worst case time complexity of searching an element. c)A binary search is having O(n) as run time complexity. d)A binary search is having O(log n) as run time complexity.	5	c

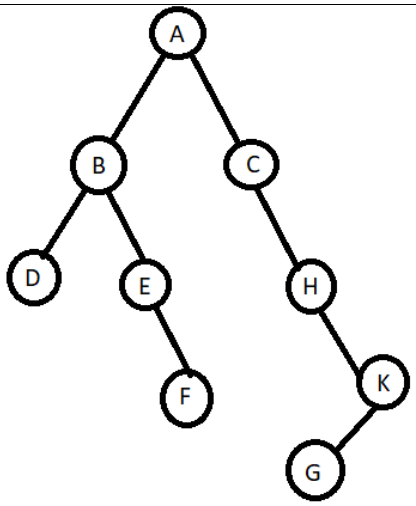
	MCQ	Which of the following is not correct? a)Bubble sort algorithm compares adjacent elements. b)In insertion sort a sub list is maintained which is sorted. c) Merge sorting algorithm follows divide and conquer approach. d)Bubble sort algorithm possesses O(n) as worst case complexity.	5	d
	MCQ	Which of the following is not correct? a) A linear search algorithm is performed on sorted list. b)Merge sorting algorithm follows divide and conquer approach. c)A binary search is having O(log n) as run time complexity. d)Quick sorting algorithm follows divide and conquer approach.	5	a
	MCQ	Which of the following is not correct? a)Quick sort algorithm uses a pivot element and divides list to two sub parts. b)The heap sort is performed from top -bottom order. c)A linear search algorithm can have O(n) as worst case time complexity of searching an element. d)A binary search is having O(log n) as run time complexity.	5	b

SECTION-B(Answer Any Three Questions. Each Question carries 12 Marks)

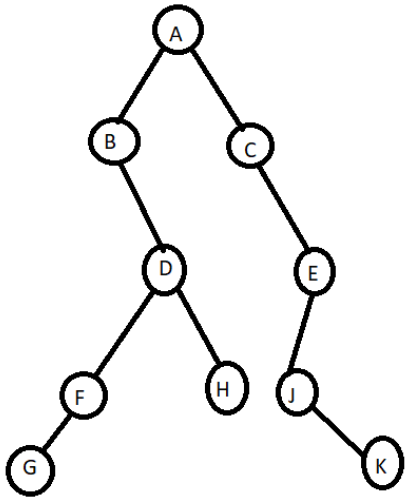
Time: 1 Hour and 30 Minutes **(3×12=36 Marks)**

Question No	Question	CO Mapping (Each question should be from the same CO(s))
Q.No:8	i)Assume in a school some students are standing in a circular way where each student is holding the hands of the students standing on both the sides. Write the c program / algorithm to visit all the students once only. ii) Explain the benefits of sparse matrix and how it is presented? Write the algorithm /function to implement addition of two sparse matrices.	CO1,2
	i) Write the algorithm / function to find the sum of alternate node's values starting from any user defined position till the last in a single linked list. ii) Explain the significance of time complexity and space complexity with examples.	
	i) Write the algorithm / function to remove all the alternate nodes starting from any user defined position till the end in a double linked list. ii) Explain the concept of an Abstract Data Type and how it is implemented in algorithms.	
Q.No:9	i) Explain the benefits of using fixed memory allocation concept using an array. Explain how one circular queue can be implemented using an array with a suitable example. ii) Evaluate the following infix expression to postfix using stack by mentioning the respective steps used to solve the expression. A+B/C*(D-E)-(F-G*H)	CO3
	i) Evaluate the following infix expression to prefix using stack by mentioning the respective steps to solve. A/B-C*(D+E*F)-(G+H/K)	

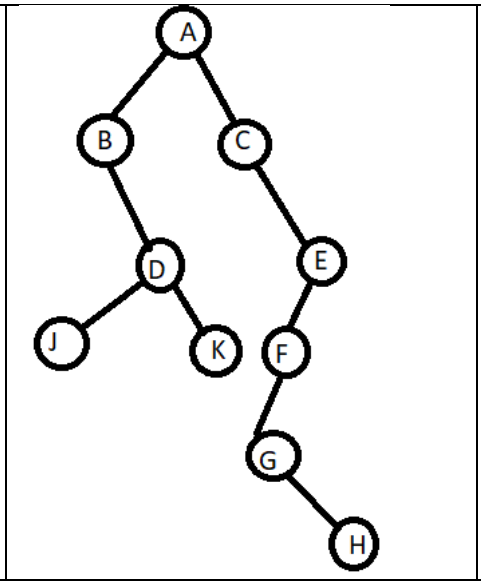
	ii) Assume in a toll gate the vehicles are lined to pay the respective amount. Write the algorithm or C program to show the exit from the toll gate.	
	i) Is it possible to insert an element in a queue from both front and rear end? Write the algorithm or C program to justify the concept. ii) Evaluate the following postfix expression to find the answer by mentioning the respective steps using stack. 10 5 4 * + 8 2 / - 3 4 * 2 - -	
Q.No:10	i) Write the c program to sort the array elements by swapping adjacent elements. ii) Write a program/algorithm to print all the number of distinct pairs in an array whose sum is greater than n(value of n is user input).	CO5
	i) Explain the effectiveness and complexity of insertion sort with a suitable example. ii) Write a program / algorithm to print the number(s) which has highest number of occurrence in an array.	
	i) Explain the use of the pivot element in quick sort algorithm with a suitable example. ii) Write a program / algorithm to print the number(s) having least frequency of occurrence in an array.	
Q.No:11	i) Why implementing an AVL tree is preferred in data structure? Construct the AVL tree with the following given node values 10 3 15 12 14 11 9 8 25 37 21 20 30 ii)Find the post-order, pre-order and in-order traversal of the following Binary Tree.	CO4,6



i) Discuss the worst case time complexity of searching a node in a Binary Search Tree by taking a suitable data set with at least 10 nodes.
ii) Find the post-order, pre-order and in-order traversal of the following Binary Tree.



i) Explain the algorithm to delete the root node from an AVL Tree with an example.
ii) Find the in-order, pre-order and post-order traversal of the following Binary Tree.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