Model Question Paper-I with effect from 2023-24 (CBCS Scheme)

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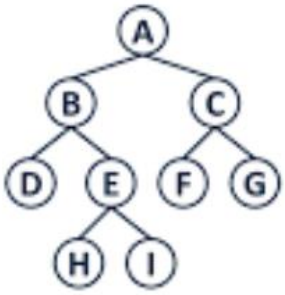
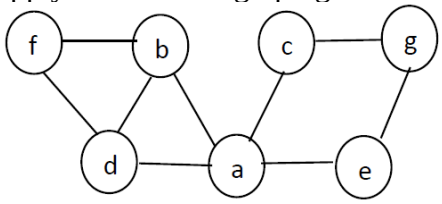
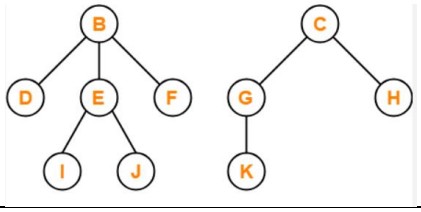
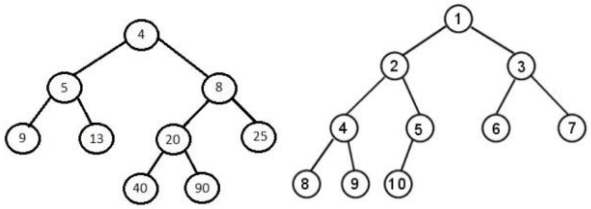
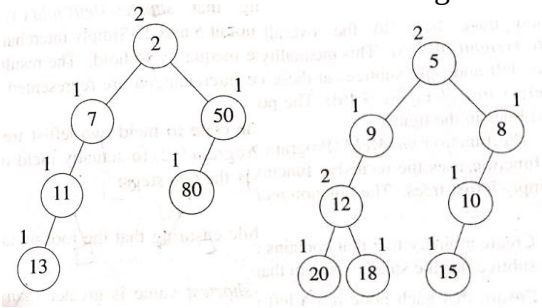
Third Semester B.E. Degree Examination
Data Structures and Applications

TIME: 03 Hours **Max. Marks: 100**

Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

		Module -1	*Bloom's Taxonomy Level	Marks
Q.01	a	Define data structures. With a neat diagram, explain the classification of data structures with examples.	L2	5
	b	What do you mean by pattern matching? Outline the Knuth Morris Pratt (KMP) algorithm and illustrate it to find the occurrences of the following pattern. P: ABCDABD S: ABC ABCDAB ABCDABCDABDE	L3	8
	c	Write a program in C to implement push, pop and display operations for stacks using arrays.	L3	7
		OR		
Q.02	a	Explain in brief the different functions of dynamic memory allocation.	L2	5
	b	Write functions in C for the following operations without using built-in functions i) Compare two strings. ii) Concatenate two strings. iii) Reverse a string	L3	8
	c	Write a function to evaluate the postfix expression. Illustrate the same for the given postfix expression: ABC-D*+E$F+ and assume A=6, B=3, C=2, D=5, E=1 and F=7.	L3	7
		Module-2		
Q. 03	a	Develop a C program to implement insertion, deletion and display operations on Linear queue.	L3	10
	b	Write a program in C to implement a stack of integers using a singly linked list.	L3	10
		OR		
Q.04	a	Write a C program to implement insertion, deletion and display operations on a circular queue.	L3	10
	b	Write the C function to add two polynomials. Show the linked representation of the below two polynomials and their addition using a circular singly linked list P1: 5x3 + 4x2 +7x + 3 P2: 6x2 + 5 Output: add the above two polynomials and represent them using the linked list.	L3	10

		Module-3		
Q. 05	a	Write recursive C functions for inorder, preorder and postorder traversals of a binary tree. Also, find all the traversals for the given tree. 	L3	8
	b	Write C functions for the following i) Search an element in the singly linked list. ii) Concatenation of two singly linked list	L2	6
	c	Define Sparse matrix. For the given sparse matrix, give the linked list representation: $A = \begin{bmatrix} 0 & 0 & 3 & 0 & 4 \\ 0 & 0 & 5 & 7 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 2 & 6 & 0 & 0 \end{bmatrix}$	L3	6
		OR		
Q. 06	a	Write C Functions for the following i) Inserting a node at the beginning of a Doubly linked list Deleting a node at the end of the Doubly linked list	L3	8
	b	Define Binary tree. Explain the representation of a binary tree with a suitable example.	L2	6
	c	Define the Threaded binary tree. Construct Threaded binary for the following elements: A, B, C, D, E, F, G, H, I	L3	6
		Module-4		
Q. 07	a	Design an algorithm to traverse a graph using Depth First Search (DFS). Apply DFS for the graph given below. 	L3	8
	b	Construct a binary tree from the Post-order and In-order sequence given below In-order: GDHBAEICF Post-order: GHDBIEFCA	L2	6
	c	Define selection tree. Construct min winner tree for the runs of a game given below. Each run consists of values of players. Find the first 5 winners. 10 9 20 6 8 9 90 17 15 20 20 15 15 11 95 18 16 38 30 25 50 16 99 20 28	L2	6

		OR		
Q. 08	a	Define Binary Search tree. Construct a binary search tree (BST) for the following elements: 100, 85, 45, 55, 120, 20, 70, 90, 115, 65, 130, 145. Traverse using in-order, pre-order, and post-order traversal techniques. Write recursive C functions for the same.	L3	8
	b	Define Forest. Transform the given forest into a Binary tree and traverse using inorder, preorder and postorder traversal. 	L2	6
	c	Define the Disjoint set. Consider the tree created by the weighted union function on the sequence of unions: union(0,1), union(2,3), union(4,5), union(6,7), union(0,2), union(4,6), and union(0,4). Process the simple find and collapsing find on eight finds and compare which find is efficient.	L2	6
		Module-5		
Q. 09	a	What is chained hashing? Discuss its pros and cons. Construct the hash table to insert the keys: 7, 24, 18, 52, 36, 54, 11, 23 in a chained hash table of 9 memory locations. Use h(k) = k mod m.	L3	10
	b	Define the leftist tree. Give its declaration in C. Check whether the given binary tree is a leftist tree or not. Explain your answer. 	L2	5
	c	What is dynamic hashing? Explain the following techniques with examples: i) Dynamic hashing using directories ii) Directory less dynamic hashing	L2	5
		OR		
Q. 10	a	What is a Priority queue? Demonstrate functions in C to implement the Max Priority queue with an example. i) Insert into the Max priority queue ii) Delete into the Max priority queue iii) Display Max priority queue	L3	10
	b	Define min Leftist tree. Meld the given min leftist trees. 	L2	5
	c	Define hashing. Explain different hashing functions with examples. Discuss the properties of a good hash function.	L2	5