Basavarajeswari Group of Institutions

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

USN											Course Code	2	1	C	S	3	3

Third Semester B.E. Degree Examinations, March/April 2023
DATA STRUCTURE AND APPLICATIONS
(Common to CSE & AIML)

Duration: 3 hrs **Max. Marks: 100**

Note: ***1. Answer any* FIVE *full questions, choosing* ONE *full question from each module.***
2. Missing data, if any, may be suitably assumed

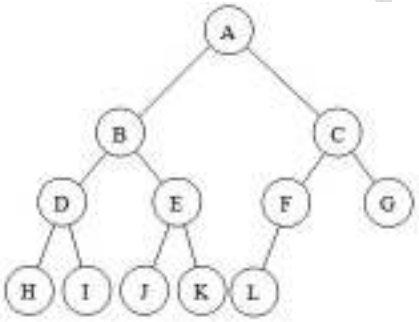
Q. No		Question	Marks	(RBTL:CO: PI)
		MODULE – 1		
1.	**a.**	Define data structures and give the classification.	**07**	(3 :1: 1.4.1)
	b.	Define Pointer and Explain how to declare and initialize pointer variable with an example program.	**06**	(3 :1: 1.4.1)
	c.	Write a C program define Employee structure using the concept of nested structures to read N employee details and display the same on the screen.	**07**	(3 :1: 1.7.1)
		OR		
2.	**a.**	List and explain different types of Dynamic Memory Allocation functions	**06**	(3 :1: 1.4.1)
	b.	Write a function to Add two Polynomials	**07**	(3 :1: 1.7.1)
	c.	Write a program to find transpose of a sparse matrix.	**07**	(3 :1: 1.7.1)
		MODULE – 2		
3.	**a.**	Define Stack? Explain the different operations that can be performed on stack using C functions.	**10**	(3 :2: 1.4.1)
	b.	Apply the algorithm and show the contents of stack to convert the following parenthesized Infix expression to postfix. (A+B$D)/(E-F) +G	**10**	(3 :2: 1.7.1)
		OR		
4.	**a.**	Write an Algorithm to evaluate a postfix expression and apply the same for the given postfix expression. **ABC-D*+E^F+** and assume **A=6,B=3,C=2,D=5,E=1,F=7.**	**08**	(3 :2: 1.7.1)
	b.	Write a Recursive Function to find sum of N natural numbers.	**04**	(3 :2: 1.7.1)
	c.	Write a C Program to Implement Circular Queues Operation using Arrays.	**08**	
		MODULE – 3		
5.	**a.**	What are the advantages of Linked List Over arrays?	**04**	(3 :3: 1.4.1)
	b	Write the Algorithm for the following operation using Singly linked list i) Inserting new node at the front end of the linked list. ii) Inserting new node in between the linked list.	**06**	(3 :3: 1.7.1)
	c.	Write C functions to perform following operations on SLL i) Find the length of list and sum of elements of list ii) Search for given key Element	**10**	(3 :3: 1.7.1)
		OR		

6	**a.**	Write c function to perform following operations on DLL i)Insert anywhere ii)Delete a specified node	**08**	(3 :3: 1.7.1)
	b.	Write the Algorithm for the following operation using circular linked list i) Inserting new node at the front end of the circular linked list. ii) Inserting new node in between the circular linked list. iii) Displaying content of circular linked list in reverse order.	**08**	(3 :3: 1.7.1)
	c.	Write a diagrammatic linked representation of the given sparse matrix. $\begin{pmatrix} 0 & 1 & 2 \\ 3 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$	**04**	(3 :3: 1.7.1)

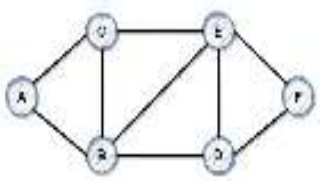
MODULE – 4

7.	**a.**	Define the following terms with examples i)Tree ii) Depth of tree iii) Complete Binary tree	**06**	(3 :4: 1.4.1)
	b.	Construct Binary search tree for the given data **100, 85, 45, 55, 110,20, 70,65** and show the array and linked representation of the same**.**	**08**	(3 :4: 1.7.1)
	c.	Prove that N0=N2+1 in a Binary Tree	**06**	(3 :4: 1.3.1)

OR

8.	**a.**	Write a in-order, pre-order, post-order traversal expression for the following tree. 	**06**	(3 :4: 1.7.1)
	b.	Write a Recursive search function to search an element in a binary search tree.	**06**	(3 :4: 1.7.1)
	c.	Write a short note on Threaded binary tree.	**08**	(3 :4: 1.4.1)

MODULE – 5

9.	**a.**	Construct balanced AVL trees for the months of the year.	**08**	(3 :5: 1.7.1)
	b.	Define Graph. Give the adjacency matrix and adjacency list for the graph given below. 	**06**	(3 :5: 1.4.1)
	c.	What are the methods used for traversing a graph? Explain with an example.	**06**	(3 :5: 1.4.1)

OR

10.	**a.**	List and explain different types of Hashing Functions**.**	**08**	(1 :5: 1.4.1)
	b.	Explain different types of operations on **RED-BLACK** trees	**06**	(1 :5: 1.4.1)
	c.	Write a short note on **SPLAY** trees	**06**	(1 :5: 1.4.1)

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Note: (**RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator)**