

**P.E.S. College of Engineering, Mandya - 571 401***(An Autonomous Institution affiliated to VTU, Belagavi)***Third Semester, B.E. - Computer Science and Engineering****Semester End Examination; March - 2021****Data Structures**

Time: 3 hrs

Max. Marks: 100

**Course Outcomes***The Students will be able to:**CO1: Design and Implement standard data structures like stack using recursion.**CO2: Design and implement operations on linked list.**CO3: Develop programs to implement different queues.**CO4: Design and implement different tree traversal techniques using iteration and recursion.**CO5: Implement sorting and searching techniques.***Note: I) PART - A is compulsory. Two marks for each question.****II) PART - B: Answer any Two sub questions (from a, b, c) for Maximum of 18 marks from each unit.**

Q. No.	Questions	Marks	BLs	COs	POs
<b>I : PART - A</b>		<b>10</b>			
I a.	Write a C program to display the elements of an array using pointers.	2	L2	CO1	PO1
b.	Differentiate malloc( ) and calloc( ).	2	L2	CO2	PO1
c.	List the advantages and disadvantages of linked list over arrays.	2	L1	CO3	PO1
d.	Define the following:	2	L1	CO4	PO1
	i) Complete binary tree                      ii) Almost complete binary tree				
e.	Apply Radix sort to arrange the following numbers in ascending order: 20, 84, 43, 45, 36, 62, 57, 79, 28, 84.	2	L3	CO5	PO1
<b>II : PART - B</b>		<b>90</b>			
<b>UNIT - I</b>		<b>18</b>			
1 a.	Explain the concept of pointers as function arguments. Write a program to find maximum of two elements using pointer and function. The function should return the maximum.	9	L2,4	CO1	PO3,1
b.	List the applications of stacks. Using stack, write a C program to determine, if a given string is palindrome or not and print the suitable message as output.	9	L2,4	CO1	PO3,1
c.	i) Write an algorithm for converting infix expression to postfix expression.	9	L3,4	CO1	PO1,2,3
	ii) Given the following expression, give their postfix and prefix form:				
	I) $I(A+B)*(D.C)$ II) $X\$Y*Z-M+N+P/Q/(R+S)$				

Contd... 2

**UNIT - II**

**18**

- 2 a. With suitable example, explain the advantages of circular queues over linear queues. Write a C routine for;
- i) Inserting an element into circular queues
  - ii) Display the content of circular queues
- b. Define Recursion. Write a C function for the following:
- i) Sum of  $N$  integer's
  - ii) Tower of Hanoi problem
- c. With suitable example and C routines, explain the operations Insert-Front and Delete-Rear of a double ended queue.

**UNIT - III**

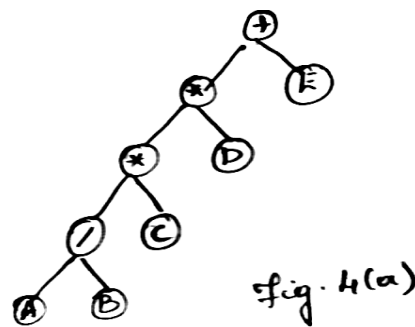
**18**

- 3 a. Explain the various dynamic memory allocation functions in detail.
- b. Using the header node concept, write a C program to implement stacks using circular linked list.
- c. Write C routines to;
- i) Concatenate two singly linked list
  - ii) Delete a node whose position is specified in a given doubly linked list

**UNIT - IV**

**18**

- 4 a. Write recursive C routines to implement various tree traversal techniques for the tree in Fig.4 (a). Obtain inorder, preorder and postorder traversal.



9 L6 CO4 PO1,2

- b. Explain Binary Search Tree with an example. Write a recursive algorithm to search for an item in a given Binary Search Tree.
- c. Explain Threaded Binary Tree in detail.

**UNIT - V**

**18**

- 5 a. Write a C program to sort the given elements in ascending order using binary tree sort method.
- b. Write a C program to sort the given element in descending order using Radix sort method.
- c. Explain ordered list search with an algorithm