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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.

<u>**Note:**</u> **I) PART - A** is compulsory. **Two** marks for each question.
  II) PART - B: Answer any <u>**Two**</u> sub questions (from a, b, c) for Maximum of **18 marks** from each unit.

Q. No.	Questions	Marks	BLs	COs	POs
	I : PART - A	**10**			
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: i) Complete binary tree ii) Almost complete binary tree	2	L1	CO4	PO1
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
	II : PART - B	**90**			
	UNIT - I	**18**			
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. ii) Given the following expression, give their postfix and prefix form: I) I) $(A+B)*(D.C)$ II) $X\$Y*Z-M+N+P/Q/(R+S)$	9	L3,4	CO1	PO1,2,3

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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	9	L2,4	CO2	PO1,3
b.	Define Recursion. Write a C function for the following: i) Sum of *N* integer's ii) Tower of Hanoi problem	9	L2,4	CO2	PO1,2,3
c.	With suitable example and C routines, explain the operations Insert-Front and Delete-Rear of a double ended queue.	9	L2	CO2	PO1,3
UNIT - III		**18**		
3 a.	Explain the various dynamic memory allocation functions in detail.	9	L2	CO3	PO1
b.	Using the header node concept, write a C program to implement stacks using circular linked list.	9	L6	CO3	PO1,2
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	9	L3	CO3	PO2,3
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

fig. 4(a)
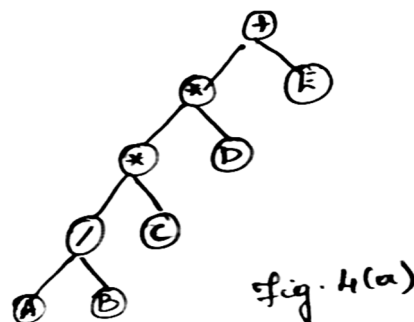
b.	Explain Binary Search Tree with an example. Write a recursive algorithm to search for an item in a given Binary Search Tree.	9	L4,3	CO4	PO1,2
c.	Explain Threaded Binary Tree in detail.	9	L2	CO4	PO1
UNIT - V		**18**		
5 a.	Write a C program to sort the given elements in ascending order using binary tree sort method.	9	L6	CO5	PO1,2,3
b.	Write a C program to sort the given element in descending order using Radix sort method.	9	L6	CO5	PO1,2,3
c.	Explain ordered list search with an algorithm	9	L4	CO5	PO1,2

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