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

Time: 3 hrs   *Max. Marks: 100*

Course Outcomes
The Students will be able to:
CO1: *Understand primitive and derived data structure and Understand Abstract data types, Stacks and recursion.*
CO2: *Develop and implement linked list.*
CO3: *Develop programs to implement different queues.*
CO4: *Understand and create trees.*
CO5: *Design an algorithm to Sorting Techniques 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 the prefix and postfix form of the following infix expression: $A-B/(C*D\$E)$	2	L3	CO1
b.	Explain how memory can be dynamically allocated using calloc( )?	2	L3	CO2
c.	Differentiate between ascending and descending priority queue.	2	L3	CO3
d.	Construct binary search tree for the input: 20, 15, 10, 18, 20, 40.	2	L3	CO4
e.	Define heap. Give one example.	2	L3	CO5
	II : PART - B	**90**		
	UNIT - I	**18**		
1 a.	Write a C program to evaluate postfix expression and trace it for the following postfix expression if $A = 1$, $B = 2$ and $C = 3$: $AB + C - BA + C\$ -$	9	L3	CO1
b.	Write a recursive C program to solve the tower of Hanoi problem. Show all the moves, if the number of disk = 3.	9	L3	CO1
c.	Define stack. Discuss PUSH and POP operations along with C routines.	9	L2,L3	CO1
	UNIT - II	**18**		
2 a.	Define singly linked list. Discuss the implementation of Queue using singly linked list	9	L2	CO2
b.	Write a C routine for the following operations on doubly linked list: i) Delete the node pointed to by *P* ii) Insert a node with information field *X* to the right of node (*P*)	9	L3	CO2
c.	Write a C function to perform the following operations on circular singly linked list: i) Delete the node following node (*P*) and stores its contest in *X* ii) Concatenate two circular linked list	9	L3	CO2

	UNIT - III	**18**		
3 a.	Discuss how to add two polynomials using singly linked list.	9	L2	CO3
b.	Give the C implementation of queue. What are the advantages of circular queue over ordinary queue?	9	L2,L3	CO3
c.	Discuss the following: i) Applications of queue ii) Double ended queue	9	L2	CO3
	UNIT - IV	**18**		
4 a.	Write recursive function to traverse a binary tree using preorder and post order. Give an example for each.	9	L3	CO4
b.	With diagram, explain the following tree types: i) Binary tree ii) Complete Binary tree iii) Full Binary tree	9	L2	CO4
c.	i) Write a C routine to insert an element into Binary Search tree.	4	L3	CO4
	ii) With an example, explain expression with tree.	5	L2	CO4
	UNIT - V	**18**		
5 a.	Write a C routine to sort the numbers using binary tree sort. Discuss the efficiency of the method.	9	L3	CO5
b.	Discuss address calculation sort along with C routine.	9	L3	CO5
c.	Discuss probability search technique.	9	L2	CO5

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