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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 / April - 2022
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 a Maximum of **18 marks** from each unit.*

Q. No.	Questions	Marks	BLs	COs	POs
	I : PART - A	**10**			
I a.	What is a pointer variable? Discuss how pointers are declared and initialized in C?	2	L2	CO1	PO1
b.	When do you use realloc( ) function? Explain with syntax.	2	L2	CO2	PO1
c.	List the advantages of Double linked list over Single linked list.	2	L1	CO3	PO1
d.	What are the advantages of Threaded binary tree?	2	L1	CO4	PO1
e.	Differentiate Binary search and Linear search.	2	L3	CO5	PO1
	II : PART - B	**90**			
	UNIT - I	**18**			
1 a.	Discuss different dynamic memory allocation function in 'C' with its syntax. Write a 'C' program to demonstrate the dynamic memory allocation.	9	L2,4	CO1	PO3,1
b.	I) Illustrate applications of stacks. Write an algorithm for infix to postfix conversion. II) Write the postfix and prefix expression for the following infix expressions: i) $X + Y * (A - B)$ ii) $A * (B + C) \$ D$	9	L2,4	CO1	PO3,1
c.	Define stack. With the 'C' function, discuss the various operations performed on stacks.	9	L3,4	CO1	PO3,1
	UNIT - II	**18**			
2 a.	Write recursive functions for; i) Factorial of a number ii) n^{th} Fibonacci number iii) Tower of Hanoi	9	L2,4	CO2	PO1,3

b.	Discuss the advantages of circular queue over ordinary queue. Mention any two applications of queues. Write a function to Insert rear and Delete rear on circular queue.	9	L2,4	CO2 PO1,3
c.	What are double ended queues? Write a 'C' program to demonstrate how double ended queue work as stacks?	9	L2	CO2 PO1,3

UNIT - III	**18**		

3 a.	Explain SLL. With a 'C' function, discuss the operations on SLL.	9	L2	CO3 PO3,2,1
b.	What are double linked list? Demonstrate its working as a queue with 'C' function.	9	L2	CO3 PO3,1
c.	What is header node? Discuss its advantages. Write a 'C' program to implement SLL using header node concept.	9	L3.4	CO3 PO3,1

UNIT - IV	**18**		

4 a.	Define the following with an example: i) Binary tree ii) Complete binary tree iii) Almost complete binary tree iv) Binary search tree v) Sibling	9	L3	CO3 PO1,3
b.	Define BST. Write a 'C' function to implement BST. Construct BST and perform different traversing for given input; 7, 9, 5, 8, 12, 6, 4, 24, 3.	9	L3	CO3 PO1,3
c.	Write a 'C' function to evaluate the expression represented by a binary tree. Construct a binary tree for the expression, $A + (B - C) * (E + F) / G$.	9	L3	CO3 PO1,3

UNIT – V	**18**		

5 a.	Explain address calculation sort with an example.	9	L2	CO5 PO1,2,3
b.	Perform Radix sort for the following elements: 81, 76, 93, 23, 57, 68, 12, 08, 31, 28, 39. Write a 'C' function which perform Radix sort.	9	L4	CO5 PO1,2,3
c.	Explain probability search with an algorithm.	9	L4	CO5 PO1,2

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