B. M. S. COLLEGE OF ENGINEERING, BENGALURU-19

Autonomous Institute, Affiliated to VTU

DEPARTMENT OF CSE

Sem	**3rd**		
Course Title:	**Data Structures**		
Course Code:	**19CS3PCDST**		
L-T-P:	**3-0-1**	**Total Credits:**	**4**

A Syllabus

Unit No.	Topics	Hrs	Text book No. from which Unit topics are being covered
1	**Basic concepts:** Structures, Pointers and dynamic memory allocation. **Stack**: Definition and examples, Representation of stacks in C **Applications of Stack**: Converting an expression from Infix to postfix and Evaluation of Expression. Recursion: Factorial, Fibonacci Sequence, Tower of Hanoi	9	Textbook1 Chapter 1: 1.4 Chapter 2: 2.3 Chapter 1: 1.2 Textbook2 Chapter 2: 2.1, 2.2, 2.3 Chapter 3: 3.2, 3.3
2	**Queues**: The queue and its sequential representation, Linear queue, Circular Queues, Double Ended Queue, Priority Queues.	8	Textbook1: 3.3 Textbook 2 Chapter 4: 4.1
3	**Linked Lists**: Linked list, Array implementation of Lists, Limitations of the array implementation, Allocating and freeing dynamic variables, Linked list using dynamic variables. Operations on singly linked list: Insert, Delete, Display, Concatenate, Search, Merge, Sort, Reverse. Linked list: Linked Stacks and Queues	7	Textbook 2: Chapter 4: 4.2 Textbook 1: Chapter 4: 4.4
4	**Circular lists and it's basic operations**: Insert, Delete and Display. **Doubly linked lists and it's basic operations:** Insert, Delete and Display. **Applications of linked lists:** Addition of long positive integers using circular list, Adding Polynomials**.** **Hashing:** Hash tables, Hash function, Overflow handling: Open Addressing, Chaining	7	Textbook1 Chapter 5: 5.1, 5.2, 5.3, 5.7
5	**Trees**: Introduction, Representation of trees, Binary Tree, Properties of Binary Trees, Binary tree representation- Binary tree traversals, Binary Search Tree(BST): Definition, Searching a BST, Inserting into BST, deletion from BST	8	Textbook1 Chapter 10: 10.2, 10.4 Chapter 5: 5.5 Chapter 8: 8.2

Prescribed Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1	Fundamentals of Data Structures in C	Horowitz, Sahni, Anderson Freed	Second	Universities Press	2008
2.	Data Structures using C	Aaron M.Tenenbaum, Yedidyah Langsam, Moshe J. Augenstein	Fifth	Pearson education	2007

Reference Text Book

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Data structures and program design in C	Robert L. Kruse, Clovis L. Tondo, Bruce P. Leung	Second	Prentice Hal	1997
2	Data Structure using C	A.M Padma Reddy	Thirteenth edition	Sri Nandi	2013

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E-Book						
Sl. No.	**Book Title**	**Authors**	**Edition**	**Publisher**	**Year**	**URL**
1.	Data Structures using C	Reema Thareja	Second Edition	Oxford Univsersity press	2014	https://www.academia.edu/28758384/ Data_structures_using_c_2nd_reema_thareja

MOOC Course				
Sl. No.	**Course name**	**Course Offered By**	**Year**	**URL**
1.	Data Structures	Coursera		https://www.coursera.org/learn/data-structures
2.	Data Structures and algorithms	NPTEL		https://nptel.ac.in/courses/106102064/

B Course Outcomes

At the end of the course the student will be able to

CO1	Apply the concept of linear and nonlinear data structures to various applications
CO2	Analyse the usage of appropriate data structure for a given application
CO3	Design and implement operations of linear and nonlinear data structure
CO4	Ability to conduct practical experiments for demonstrating the operations of different data structures.

C CO-PO-PSO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1														
CO2		2													
CO3			3												
CO4			3		3										3

D Assessment Plan (for 50 marks of CIE)

Tool	**Remarks**	**Marks**
Internals	**---**	**20**
Quiz/AAT	**---**	**5**
Lab Component	**---**	**25**
Total		**50**

E Tutorial Plan *(if applicable)*

F Laboratory Plan *(if applicable)*

Lab Program	Unit #	Program Details
1	**1**	Write a program to simulate the working of stack using an array with the following : a) Push b) Pop c) Display The program should print appropriate messages for stack overflow, stack underflow
2	**1**	WAP to convert a given valid parenthesized infix arithmetic expression to postfix expression. The expression consists of single character operands and the binary operators + (plus), - (minus), * (multiply) and / (divide)
3	**2**	WAP to simulate the working of a queue of integers using an array. Provide the following operations a) Insert b) Delete c) Display The program should print appropriate messages for queue empty and queue overflow conditions
4	**2**	WAP to simulate the working of a circular queue of integers using an array. Provide the following operations. a) Insert b) Delete c) Display The program should print appropriate messages for queue empty and queue overflow conditions
5	**3**	WAP to Implement Singly Linked List with following operations a) Create a linked list. b) Insertion of a node at first position, at any position and at end of list. c) Display the contents of the linked list.
6	**3**	WAP to Implement Singly Linked List with following operations a) Create a linked list. b) Deletion of first element, specified element and last element in the list. c) Display the contents of the linked list.
7	**3**	WAP Implement Single Link List with following operations a) Sort the linked list. b) Reverse the linked list. c) Concatenation of two linked lists
8	**3**	WAP to implement Stack & Queues using Linked Representation
9	**4**	WAP Implement doubly link list with primitive operations a) Create a doubly linked list. b) Insert a new node to the left of the node. c) Delete the node based on a specific value. c) Display the contents of the list
10	**5**	Write a program a) To construct a binary Search tree. b) To traverse the tree using all the methods i.e., in-order, preorder and post order c) To display the elements in the tree.

G Proposed Alternate Assessment Tool Plan *(if applicable)*

H SEE Exam Question paper format

Unit-1	Mandatory	One Question to be asked for 20 Marks
Unit-2	Mandatory	One Question to be asked for 20 Marks
Unit-3	Internal Choice	Two Questions to be asked for 20 Marks each
Unit-4	Internal Choice	Two Question to be asked for 20 Marks each
Unit-5	Mandatory	One Questions to be asked for 20 Marks

Bloom's Level	**Percentage of Questions to be Covered**
Remember / Understand	**35%**
Apply / Analyze	**40%**
Create / Evaluate	**25%**