Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Tut.	Pract / Oral	Theory	Tut.	Pract/ Oral	Total
PCC2011	Data Structure	2	--	-	2	-	-	2

Course Code	Course Name	Theory					Term work	Pract / Oral	Total
		Internal Assessment Test (IAT)			End Sem Exam	Exam Duration (in Hrs)			
		IAT-I	IAT-II	IAT-I + IAT-II (Total)					
PCC2011	Data Structure	20	20	40	60	2	--	--	100

Course Objectives: The course aims to

1. Learn the purpose and significance of data structures, as well as their fundamentals.

2. Learn linear and nonlinear data structures, as well as how they are implemented.

3. Analyze the data structures, such as stacks, queues

4. Learn the terminologies, types and various operations in Linked list

5. Explore the fundamentals of Tree and learn about its operations and applications.

6. Explore the real time applications of various data structures

Course Outcomes: After successful completion of the course students will be able to

1. Classify and Apply the concepts of Linear and Non-Linear data structures in real life problem solving and apply the operations like insertion, deletion, and traversal operations on them.

2. Explore data structures such as Stacks, learn about their operations, and use them to solve problems in a variety of domains.

3. Examine Queue data structures and use them to address real-world problems.

4. Apply the concept of Linked list to evaluate the problems in a diverse applications

5. Analyze and apply the concepts of Trees and their applications in real life problem solving.

6. Demonstrate the ability to analyze, construct, implement, and use data structures to solve real-world problems and evaluate their effectiveness.

Prerequisite: Concepts in C Programming

DETAILED SYLLABUS:

Sr. No.	Name of Module	Detailed Content	Hours	CO Mapping

0	**Prerequisite**	Concepts of Functions, Recursion, Arrays, Pointers, Structures and C programming constructs.		
I	**Introduction**	Introduction to Data Structures, Concept of ADT, Types of Data Structures- Linear, Nonlinear, Static, Dynamic and operations on Data Structures.	**2**	**CO 1** **CO 2**
II	**Stack**	Introduction to Stack, Stack as ADT, ADT Operations on Stack, Array Implementation of Stack, Multiple Stacks, Evaluation of Arithmetic Expressions.	**4**	**CO 1** **CO3**
III	**Queue**	Introduction to Queue, ADT operations on Queue, Array Implementation of Queue, Types of Queues: Circular Queue, Priority Queue, Double Ended Queue and Multiple Queues	**5**	**CO 1** **CO 3**
IV	**Linked List**	Concept of Linked Lists, Linked List v/s Array, Types of Linked List- Singly linked lists, doubly linked lists and circular linked lists. Insertion, deletion, update and copying operations with Singly linked lists, doubly linked lists. Implementation of Stack and Queue using linked list. Reversing a singly linked list.	**6**	**CO 1** **CO 4**
V	**Tree**	Introduction to Trees, Tree Terminologies, Binary Tree, Binary Tree Representation, Types of Binary Tree, Binary Tree Traversals, Binary Search Tree, Insert, Delete, Search Operations on Binary Search Tree.	**5**	**CO 1** **CO 5**
VI	**Applications of Data Structures**	**Stacks:** Conversion of Arithmetic Expressions using Infix, Prefix and Postfix Notations, Reversing a String/List, Parentheses Checker. **Trees**: Representing expressions using of Expression tree and Huffman Encoding.	**4**	**CO 1** **CO 6**

Text Books:
1. Aaron M Tenenbaum, Yedidyah Langsam, Moshe J Augenstein, "Data Structures Using C", Pearson Publication.
2. Reema Thareja, " Data Structures using C", Oxford Press.
3. E. Balagurusamy, "Data Structure Using C", Tata McGraw-Hill Education India.
4. Richard F. Gilberg and Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C", 2ndEdition, CENGAGE Learning.

References:
1. Sahni Horowitz, Fundamentals of data structures in C, computer science press, 2008.
2. Jean Paul Tremblay, P. G. Sorenson, "Introduction to Data Structure and Its Applications", McGraw-Hill Higher Education
3. Narasimha Karumanchi, Data Structures And Algorithms, 5th Edition,CareerMonk, 2016.
4. Robert Kruse, C. L. Tondo, Bruce Leung, "Data Structures and Program Design in C", Pearson Publication.

Online References:

Sr. No.	Website Name
7.	https://nptel.ac.in/courses/106/102/106102064/

| 8. | Data Structure using C Programming - Course (swayam2.ac.in) |

Assessment:
Internal Assessment (IA) for 20 marks each:

- IA will consist of Two Compulsory Internal Assessment Tests. Approximately 40% to 50% of the syllabus content must be covered in the IAT-I and the remaining 40% to 50% of the syllabus content must be covered in the IAT-II.

End Semester Theory Examination:
➢ **Question paper format**

- Question Paper will comprise a total of **six questions each carrying 15 marks Q.1** will be **compulsory** and should **cover the maximum contents of the syllabus**

- **Remaining questions** will be **mixed in nature** (part (a) and part (b) of each question must be from different modules. For example, if Q.2 has part (a) from Module 3 then part (b) must be from any other Module randomly selected from all the modules)

- A total of **four questions** need to be answered