Devi Ahilya University, Indore, India Institute of Engineering & Technology				**II Year B.E. (Computer Engineering) (Full Time)**			
Subject Code & Name	**Instructions Hours per Week**			**Credits**			
CER3C3	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
DATA STRUCTURES	**3**	**1**	**2**	**3**	**1**	**1**	**5**
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. To provide the knowledge of basic data structures and their implementations.
2. To understand importance of data structures in context of writing efficient programs.
3. To develop skills to apply appropriate data structures in problem solving.

Prerequisites : Computer Programming knowledge

COURSE CONTENTS

UNIT-I

Arrays and List: Array: Definition, Representation, Address Calculation; Searching: Linear search, Binary search; Sorting: Bubble sort, Insertion sort, Selection sort, Radix sort, Shell sort; List: Introduction, Implementation as Linked list, Circular linked List, Doubly linked list, Applications of linked list.

Unit-II

Stacks: Definition, Representations : static and dynamic, Implementation of stack, Applications of stack: Polish notation representation and conversion, Tower of Honoi problem, Implementation of recursion, Quick sort and Merge sort.

Unit-III

Queues and Hashing: Definition, Representations, Static and dynamic, Circular Queue, Double ended Queue, Priority Queue, applications of queues. Hash Structures: Representation, Search and Implementation and other issues.

Unit-IV

Trees: Definition, Basic terminology, Binary tree, Complete Binary Tree, representations: Static and dynamic, Traversal techniques in binary tree, Heap tree & its applications, Binary Search tree, AVL tree, M-way search trees, B-tree & its variations.

Unit-V

Graphs: Definition, Basic terminology, Graph Types, Representations: static, dynamic; Implementations, Searching in graphs – BFS, DFS, Shortest path in graphs, Applications.

Learning Outcomes :

Upon Completing the Course, Students will able to:

1. Learn the basic types for data structure, implementation and application.
2. Know the strength and weakness of different data structures.
3. Use the appropriate data structure in context of solution of given problem..
4. Develop programming skills which require to solve given problem.

BOOKS RECOMMENDED:

[1] E. Horowitz & Sahni,Fundamental Data Structure, Galgotia Book Source, 1983.

[2] A. Tannenbaum, Data Structure Using C, Pearson Education, 2003.

[3] Kruz, Data Structure and Programming Design, 1987.

[4] N. Wirth, Algorithms +Data Structure = Program, Prentice Hall of India, 1979.

[5] Goodrich & Tamassia, Data Structures and Algorithms in C++, 2nd Edition, John Wiley & Sons, 2011.

List of Practical Assignments:

1. Implementation of searching and sorting techniques.
2. Implementation of list using array and linked list.
3. Implementation of push and pop operation on stack
4. Implementation of polish notation and its conversion
5. Write a program to solve the problems using iteration/recursion
6. Program for recursion removal using stack
7. Program for insertion /deletion operation on various queue & Implementation of priority queue for process scheduling
8. Program for storing data as tree structure and implementation of various traversal techniques
9. Program for storing data as graph structure and implementation of various traversal techniques
10. Program for finding shortest path in graph
