Government PG College, Ambala Cantt

Course File(Session 2023-24)

Name of Professor: Manisha Saini

Class: BCA-II/4th Semester/ SECTION: A and B

Subject code and Name: BCA – 241 / Advanced Data Structure

SYLLABUS

Maximum Marks: 100 **External: 80**

Minimum Pass Marks: 35 **Internal: 20**

Time: 3 hours

Note: Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of objective type/short-answer type questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

UNIT – I

Tree: Introduction, Definition, Representing Binary tree in memory, Traversing binary trees, Traversal algorithms using stacks, Binary search trees: introduction, storage, Searching, Insertion and deletion Binary search tree, Huffman's algorithm, General trees

UNIT –II

Graph: Introduction, Graph theory terminology, Sequential and linked representation of graphs, operations on graphs, traversal algorithms in graphs and their implementation, Warshall's algorithm for shortest path, Dijkstra algorithm for shortest path.

UNIT – III

Sorting: Internal & external sorting, Radix sort, Quick sort, Heap sort, Merge sort, Tournament sort, Comparison of various sorting and searching algorithms on the basis of their complexity

UNIT – IV

Files: Introduction Attributes of a file, Classification of files, File operations, Comparison of various types of files, File organization: Sequential, Indexed-sequential, Random-access file. Hashing: Introduction, Collision resolution.

TEXT BOOKS:

1. Seymour Lipschutz, "Data Structure using C", Tata-McGraw-Hill

2. Horowitz, Sahni & Anderson-Freed, “Fundamentals of Data Structures in C", University Press

REFERENCE BOOKS:

1. Trembley, J.P. And Sorenson P.G., “An Introduction to Data Structures With Applications”, Mcgrraw-Hill International Student Edition, New York.

2. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, Addison-Wesley, (An Imprint Of Pearson Education), Mexico City.

COURSE OBJECTIVES

The course objectives outlined are as follows:

- Understanding advanced data structures such as trees, graphs, heaps, hash tables, and advanced sorting algorithms.
- Learning to analyze the time and space complexities of algorithms involving these data structures.
- Developing skills to design, implement, and manipulate complex data structures efficiently.
- Applying data structures to solve real-world problems in software development and computational tasks.
- Enhancing problem-solving abilities and algorithmic thinking through hands-on programming assignments.
- Preparing students for further studies in computer science or related fields and for careers in software development and data analysis.

COURSE OUTCOMES

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

- Understand the role of data structure in real life and in industry.
- Understand and remember algorithms and its analysis procedure.
- Design and implement various data structure algorithms.
- Introduce various techniques for representation of the data in the real world.
- Be familiar with advanced data structures such as binary search tree, graphs.
- Be familiar with various searching and sorting algorithms such as binary search, quick sort, merge sort, heap sort.
- Be able to write recursive methods
- Develop applications using data structure algorithms.
- Compute complexity of various algorithms.
- Understand different file types, operations performed on it and their comparisons.
- Understand different file organizations.

Lesson Plan

Week No	Scheduled Dates	Topics to be covered
1	**1-6 January**	Tree: Introduction, Definition, Representing Binary tree in memory, Traversing binary trees,
2	**8-13 January**	Traversal algorithms using stacks,
3	**15-20 January**	Binary search trees: introduction, storage, Searching, Insertion and deletion Binary search tree,
4	**22-27 January**	Huffman's algorithm, General trees, Discussion and problems
5	**29-3 February**	Graph: Introduction, Graph theory terminology, Sequential and linked representation of graphs,
6	**5-10 February**	Operations on graphs, traversal algorithms in graphs and their implementation,
7	**12-17 February**	Warshall's algorithm for shortest path
8	**19-24 February**	Dijkstra algorithm for shortest path. Problems solving and oral test.
9	**26-2 March**	Sorting: Internal & external sorting, Radix sort, Tournament sort
10	**4-9 March**	Quick sort, Merge sort, Assignment
11	**11-16 March**	Heap sort, Comparison of various sorting and searching algorithms on the basis of their complexity
12	**18-23 March**	Files: Introduction Attributes of a file, Classification of files
13	**1-6 April**	File operations, Comparison of various types of files, Hashing: Introduction, Collision resolution
14	**8-13 April**	File organization: Sequential, Indexed-sequential, Random - access file.
15	**15-20 April**	Final Test, Assignments and REVISION of Contents

16	**22-27 April**	Previous Year Question Papers Discussion