

MCA –SECOND SEMESTER

Course title: **Data Structures**
Course no: **PSCSATC221**
No. of credits: **04**
Total marks: **100**

Minor Test 1: **20 Marks of 1.5 hours duration**
Minor Test 2: **20 Marks of 1.5 hours duration**
Major Test: **60 Marks of 3.0 hours duration**

For examinations to be held in May- 2022, 2023, and 2024

Course objectives & learning outcomes:

1. To impart the basic concepts, implementations and analysis of data structures.
2. To introduce various techniques for representation of the data in the real world.
3. To strengthen the ability to solve problems with the help of fundamental data structures.
4. Student will be able to implement appropriate data structure in various domains.

UNIT-I Fundamental Notations

Primitive and composite data types, self-referential structures, Algorithms, Types of data structures, Operations, Time and space complexity of algorithms, Asymptotic notation.

UNIT-II Linear Data Structures

Arrays, Linked lists, Stacks, Queues, operations and their complexities, Implementations, Applications.

UNIT-III Non-Linear Data Structures

Trees, Binary Trees, traversing binary trees, threaded binary trees, Binary search trees, heaps, Graphs, Traversing graphs.

UNIT-IV Indexing Structures

ISAM, m-way trees, B-trees, B+-trees, Hashing techniques for direct access, Collision in hashing, Collision resolution.

UNIT-V Sorting & Searching

Internal and External sorts, Bubble sort, Insertion sort, Selection sort, Shell sort, Quick sort, Radix sort, Merge sort, Types of merging. Searching-linear and binary search methods, Comparison of sorting and searching methods.

Suggested readings/ references:

1. Seymour Lipschutz, "Data Structures with C", Schaum Outlines, 2011.
2. Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed, "Fundamentals of Data Structures in C", Universities Press (India) Pvt. Ltd, 2008.
3. Jean-Paul Tremblay and Paul G. Sorenson, "Introduction to Data Structures with Application", 2nd Edition, Tata McGraw-Hill, 2001.
4. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education India, 2001.
5. GAV Pai, "Data Structures and Algorithms", Tata McGraw Hills, 2017.
6. Peter Brass, "Advanced Data Structures", 1st Edition, Cambridge University Press, 2008.
7. YedidiahLangsam, Moshe J. Augenstein and Aaron M. Tenenbaum, "Data Structures using C and C++", 2nd Edition, Pearson Prentice Hall, 2007.
8. Adam Drozdek, "Data Structures and Algorithms in C++", 2nd Edition, Thomson Asia Pvt. Ltd, 2001.

NOTE FOR PAPER SETTERS FOR MAJOR EXAMINATIONS -

The question paper shall be divided into sections A & B as below. No question shall be repeated in the question paper.

Section A - There shall be FIVE short answer type questions of THREE mark each. In this section, questions shall be covered from each unit and the candidates shall be required to answer all the questions. **(3 x 5 = 15 marks)**

Section B - There shall be THREE long answer type questions each set from Unit -III, IV and V with internal choice. Each question shall carry FIFTEEN marks. **(3 x 15 = 45 marks)**