

SUBJECT: COMPUTER SCIENCE							
DCS	BCS-C201	Data Structures and File Processing	L	T	P	C	Time for ESE
			4	-	-	4	3 Hrs.
<b>Pre- requisite:</b> Programming knowledge of C/ C++							
<b>Course Objectives:</b>							
<ul style="list-style-type: none"> <li>To impart the basic concepts of data structures.</li> <li>To understand concepts about searching and sorting techniques</li> <li>To understand basic concepts about stacks, queues, lists, trees and graphs.</li> <li>To enable them to write algorithms for solving problems with the help of fundamental data structures.</li> </ul>							
<b>Course Outcomes:</b>							
CO1	Implement linear and binary searches.						
CO2	Write the algorithms for Stacks, Queues and singly, doubly & circular linked lists.						
CO3	Write the algorithms for Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort.						
CO4	Implement BST, Graph search and traversal algorithms.						
<b><u>Course Contents</u></b>							
UNIT	Contents						Lectures Required
1.	<b>Introduction:</b> Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. Searching: Linear Search and Binary Search Techniques and their complexity analysis.						4
2.	<b>Stacks:</b> ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis.						4
3.	<b>Queues:</b> ADT queue, Simple Queue, Circular Queue, Priority Queue. Operations on each types of Queues: Algorithms and their analysis.						4
4.	<b>Linked Lists:</b> Singly linked lists: Representation in memory, Traversing, Searching, Insertion into, Deletion; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists.						8
5.	<b>Trees:</b> Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree						10
6.	<b>Sorting and Hashing:</b> Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods.						10
7.	<b>File Organizations:</b> Sequential, indexed sequential, direct, inverted, multi-list, directory systems, Indexing using B-tree, B+ tree and their variants, hashing – hash function, collision handling methods.						8
<b>Total Lectures</b>						<b>48</b>	

**Suggested Text Book(s):**

1. M.T. Goodrich, R. Tamassia and D. Mount, Data Structures and Algorithms in C++, John Wiley and Sons, Inc.
2. Ellis Horowitz, Sartaj Sahni, Fundamentals of Data Structures, , Computer Science Press

**Suggested Reference Book(s):**

1. T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, Introduction to Algorithms, 2nd Ed., Prentice- Hall.
2. Robert L. Kruse and A.J. Ryba, Data Structures and Program Design in C++, Prentice Hall, Inc., NJ.

**Other Useful Resource(s)**

1. <https://nptel.ac.in/courses/106102064/>
2. <http://www.nptelvideos.in/2012/11/data-structures-and-algorithms.html>
3. [https://onlinecourses.nptel.ac.in/noc18\\_cs25/preview](https://onlinecourses.nptel.ac.in/noc18_cs25/preview)
4. <https://nptel.ac.in/courses/106103069/>

**Course Outcomes Contributed to Programme Outcomes**

PO→ CO↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	AVERAGE
CO1	2	3	1	2	2	3	2	2	2.1
CO2	2	3	2	3	2	3	2	2	2.4
CO3	2	3	2	2	2	3	3	3	2.5
CO4	2	3	2	2	2	3	3	3	2.5
<b>AVG.</b>	<b>2.0</b>	<b>3.0</b>	<b>1.8</b>	<b>2.3</b>	<b>2.0</b>	<b>3.0</b>	<b>2.5</b>	<b>2.5</b>	<b>2.4</b>

**Course Outcomes Contributed to Programme Specific Outcomes**

PSO→ CO↓	PSO1	PSO2	PSO3	AVERAGE
CO1	2	3	2	2.3
CO2	3	3	2	2.7
CO3	3	3	3	3.0
CO4	3	3	3	3.0
<b>AVG.</b>	<b>2.8</b>	<b>3.0</b>	<b>2.5</b>	<b>2.7</b>