BHARATI VIDYAPEETH'S
INSTITUTE OF COMPUTER APPLICATIONS & MANAGEMENT (BVICAM)
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Lesson Plan

Course: MCA-102 – Data and File Structures		
MCA – 2nd Semester	**No. of Theory Hours per Week: 04**	**No. of Practical Hours per Week: 02**

Course Outcomes (COs):

COs for Theory (MCA-102)	
CO_1	Recall different type of data structures. (BTL1)
CO_2	Explain the fundamentals of an Abstract Data Type (ADT). (BTL2)
CO_3	Apply linear and nonlinear data structures to solve real time problems. (BTL3)
CO_4	Appraise and determine the correct data structure for any given real-world problem. (BTL5)
CO_5	Create innovative solutions for real world problems. (BTL6)

Recommended Books:

Books	S. No.	Details of the Books
Text Books	1.	E. Horowitz and S. Sahni, "Fundamentals of Data Structures in C". Universities Press, Second edition, 2008. **[TB1]**
	2.	Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education India, Fourth Edition, 2014. **[TB2]**
	3.	Mary E. S. Loomis, "Data Management and File Structure", PHI, Second Edition, 2009. **[TB3]**
Reference Books	1.	Y. Langsam, M. J. Augenstein and A.M. Tanenebaum, "Data Structures using C and C++", Pearson Education India, 2nd Edition, 2015. **[RB1]**
	2.	Alfred V. Aho, John E. Hopcroft and D. Ullman, "Data Structures and Algorithms", Addison-Wesley, 1st Edition, 2002. **[RB2]**
	3.	Richard F. Gilberg and Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C", Cengage Learning, 2nd Edition, 2004. **[RB3]**

	4.	D. Malhotra and N. Malhotra, "Data Structures and Program Design using C", Laxmi Publications, Indian adapted edition from Mercury Learning and Information, USA, 1st Edition, 2018. **[RB4]**
	5.	Schaum's Outline Series, "Data Structure", TMH, Special Indian Ed., 17th Reprint, 2014. **[RB5]**
	6.	D. Samanta, "Classic Data Structures", PHI, 2nd Edition, 2009. **[RB6]**

Lesson Plan for Theory:

Lecture No.	Topics/Concepts to be Covered	Reference of the Book and its Chapter
	UNIT - I	
1.	Introduction to Linear Data Structures: Introduction and Classification of Data Structures, Abstract Data Types	TB1 [Chapters 1-4, 7]
2.	Arrays: Single Dimension, Multi Dimensions, Memory Representation	
3.	Address Calculation, Sparse Matrices-Types, Representation and Operations	
4.	Linear and Binary Search, Selection Sort	
5.	Bubble Sort, Insertion Sort, Radix Sort	
6.	Merge Sort, Shell Sort	
7.	Dynamic Memory versus Static Memory Allocation, Linked List	
8.	Operations on Linear Linked List and Circular Linked List	
9.	Operations on Doubly Linked List and Header Linked List	
10.	Applications of Linked Lists (Polynomial Arithmetic)	
11.	Stacks and Queues: Introduction, Types and Applications	
12.	Implementation of Stack, Queue, Multi Stacks, and Multi Queues	
13.	Evaluation and Conversion between Polish and Reverse Polish Notations	
14.	Quick Sort and Recursion	
15.	Buffer Reserved for Revision	

Lecture No.	Topics/Concepts to be Covered	Reference of the Book and its Chapter
	UNIT – II	
16.	Trees: Notations & Terminologies	TB1 [Chapter 5] TB2 [Chapters 4, 6]
17.	Binary Trees and Basic Operations	
18.	Binary Search Trees and Basic Operations	
19.	Tree Traversals (Recursive)	
20.	Tree Traversals (Stack Based non-Recursive)	
21.	Threaded Binary Tree, Tree Sort, Properties of AVL Trees	
22.	Insertion and Deletion Operations in AVL Tree	
23.	M-Way Trees: General Concept, B Trees	
24.	B+ Trees and B* Trees	
25.	Heaps: Structural Properties, Heapify	
26.	Heap Sort	
27.	Priority Queue Implementation	
28.	Buffer Reserved for Revision	
	UNIT – III	
29.	Graph Terminologies, Representation of Graphs using Adjacency Matrix	TB1 [Chapter 6] TB2 [Chapter 9]
30.	Representation of Graphs using Linked Representation	
31.	Insertion and Deletion Operations in Graph	
32.	Graph Traversals: Breadth First Search, Depth First Search, Connected Components.	
33.	Spanning Trees, MST, Kruskal's Algorithm for MST	
34.	Prim's Algorithm for MST	
35.	Shortest Path Algorithms: Dijkstra's Algorithm	
36.	Shortest Path Algorithms: Floyd-Warshall Algorithm, Topological Sort.	
37.	Case Studies	

Lecture No.	Topics/Concepts to be Covered	Reference of the Book and its Chapter
38.	Case Studies	
39.	Buffer Reserved for Revision	
UNIT - IV		
40.	Hashing, Hash Table, Hash Functions	TB1 [Chapters 8, 10] TB2 [Chapter 5] TB3 [Chapters 4, 10-16]
41.	Collision Resolution - Chaining	
42.	Collision Resolution - Open Addressing	
43.	File Organization: Sequential, Index Sequential, Relative	
44.	Operations on Sequential Files	
45.	Operations on Sequential Files	
46.	External Sorting: Merging Ordered Files and Unordered Files, Natural Merge, Balanced Merge	
47.	K-Way Merge	
48.	Polyphase Merge	
49.	Buffer Reserved for Revision	

Course: MCA-162 – Data and File Structures Lab.	
MCA – 2nd Semester	**No. of Practical Hours per Week: 04**

Course/Lab Outcomes (COs):

COs for Practical (MCA-162)	
CO_1	Illustrate basic data structures - arrays and linked lists. (BTL2)
CO_2	Build stacks and queues using arrays and linked lists. (BTL3)
CO_3	Discover sparse matrix, polynomial arithmetic, searching and sorting techniques and their applications. (BTL4)
CO_4	Appraise binary search tree to perform efficient search operations. (BTL4)
CO_5	Examine and implement graph algorithms. (BTL4)
CO_6	Develop an application making extensive use of binary files. (BTL6)

Lesson Plan for Practical:

Week No.	Lab No.	Topics/Concepts to be Covered	Reference of Lab Manual
1.	1.	Array	
2.	2.	Searching and Sorting in Array	
3.	3.	Linked List, Polynomial Arithmetic	
4.	4.	Stack and Queue	
5.	5.	Buffer reserved for Revision	
6.	6.	Binary Tree and Binary Search Tree	
7.	7.	Heap Sort and Priority Queue	
8.	8.	Graph	
9.	9.	Buffer reserved for Revision	
10.	10.	Hashing	
11.	11.	File Handling	
12.	12.	File Handling	
13.	13.	Buffer reserved for Revision	

Testing Schedule:

Nature of Test	May	June	July	
Surprise Test (ST)	ST in any of the Weeks	-	-	-
Mid Term Test (MT)	-	TBAL	-	-
Class Test (CT)	-	-	CT in any of the Weeks	-

Nature of Test	May	June	July	
Supplementary Test (Sp. T)	-	-	Sp. T in 1st Week	
Assignment Submission Schedule	**Assignment-1** is to be submitted One Week after completion of Unit-1 and Unit-2. **Assignment-2** is to be submitted One Week after completion of Unit-3. **Assignment-3** is to be submitted One Week after completion of Unit-4.			