

Kadi Sarva Vishwavidyalaya
Master of Computer Application (MCA)
Year – I (Semester – II) (W.E.F. August 2014)
Subject Name: Data Structures – MCA 201

Sub Total Credit	Teaching scheme		Examination scheme				
	(per week)		MID	CEC	External		Total
	Th	Pr	Th	Th	Th.	Pr.	Marks
5	3	4	25	25	50	50	150

Rationale (Course Objective) :

The purpose of this course is to provide the students with solid foundations in the basic concepts of programming: data structures and algorithms.

Learning Outcome:

The course guides the students

- To write programs in data and file structure with there applications
- To apply the concepts of data structure and to solve the practical problems
- Knowledge of file and to process the files will be revealed
- Practical based approach in data structure using C or C++

METHODOLOGY:

- Teaching would be mainly based on two way interactions & discussions.
- Practical guidelines given individually
- Students should give presentation in their subject which will enhance the subject knowledge and communication skill

Instructional Strategies:

- Generally lecture method will be adapted.
- Teaching aids such as OHP and LCD projectors will be used.
- Emphasis on self study will be handled through seminars.

Course Content:

Unit 1 Data Structures (20%)

Introduction – Arrays – Structures – Stack: Definition and examples, Representing Stacks – Queues - Linked Lists – Representation – Operations – Single Linked list – Double linked list – circular linked list - Applications of Stack, Queue and Linked Lists.

Unit 2 Trees (20%)

General trees - Binary Trees – Binary Tree Representations – traversing binary trees – Binary search tree –AVL trees - node representation: Inserting nodes – deleting node nodes

Unit 3 Sorting and Searching (20%)

Binary search – Introduction to sorting: A Selection sort – An Insertion sort – An Exchange sort: The Bubble Sort – Merge sort – The Partition Exchange sort (Quick sort) – The Heap sort

Unit 4 Graphs (20%)

Definition – Representations of graph – Graph Traversal – An application of graphs – Shortest path algorithm - Dijkstra's algorithm – An application of scheduling – Critical Paths – Spanning Trees – Kruskal's Algorithm, Prim's Algorithm

Unit 5 File Systems and Hashing

(20%)

Files – File organization – File operations – Sequential file organization: Definition – Storing Sequential Files – Declaring Sequential Files – Creating, retrieving, updating sequential file – Relative File Organization: Definition – Addressing technique – direct Mapping Technique – Directory Lookup technique Indexed Sequential File Organization: Definition – Applications – Examples – Physical layout Indexes. Hashing: Hash Function – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing

Text Books:

1. Data Management and File Structure by Mary E. S. Loomis using Prentice Hall of India
2. Weiss "Data Structures and Algorithm Analysis in C", Addison Wesley, Second Edition using Pearson Education Asia.

Chapter & Topics:

Unit -1: Chapter 2, 3, 4 [Pg.No: 53 to 63], 5, 6 [Pg. No: 96 to 99 & 108 to 121]

Unit -2: Chapter 8 [Pg. No: 160 to 176]

From Book No: 2 → Topic – 4.4

Unit-3: Chapter 9 [Pg. No: 213 to 228]

From Book No: 2 → Topic – 7.6

Unit-4: Chapter 7 [Pg. No: 133 to 150]

From Book No: 2 → Topics – 9.1, 9.3.1, 9.3.2, 9.5.1 & 9.5.2

Unit-5: Chapter 10 [Pg. No: 242 to 249]

Chapter 11 [Pg. No: 268 to 271 & 278 to 292]

Chapter 13 [Pg. No: 323 to 326 & 332 to 336]

Chapter 15: [Pg. No: 398 to 411]

From Book No: 2 → Topics – 5.1 to 5.6

Reference Books:

1. Robert Kruse & Clovis L. Tondo "Data Structures and Program Design in C", Prentice Hall, 2nd edition. 1991.
2. Classic Data Structure – D. Samanta in Prentice Hall of India

Practical: Any 'C' compiler will be used for practical programs

Practical List for DFS:

1. Represent the given sparse matrix using one dimensional array and linked list.
2. Create a Stack and do the following operations using arrays and linked lists
(i) Push (ii) Pop (iii) Peep
3. Create a Queue and do the following operations using arrays and linked lists
(i) Add (ii) Remove
4. Polynomial addition & multiplication using array and linked list
5. Circular Queue implementation using array & linked list
6. Implement the operations on singly linked list, doubly linked list and circular linked list.
7. Tree traversal using recursive and non-recursive
8. Create a binary search tree and do the following traversals
(i) In-order (ii) Pre order (iii) Post order
9. Implement the following operations on a binary search tree.
(i) Insert a node (ii) Delete a node
10. Sort the given list of numbers using all sorting techniques
11. Perform the following operations in a given graph
(i) Depth first search (ii) Breadth first search
12. Find the shortest path in a given graph using Dijkstra algorithm
13. Find the shortest path in a given graph using Kruskal's Algorithm
14. Find the Minimum spanning tree