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Description generated with very high confidence

**Course Plan**

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| **Department :** | Data Science and Computer Applications |
| **Course Name & code :** | Data Structures and Algorithms Lab & MCA 4261 |
| **Semester & branch :** | II Semester & M.C.A. |
| **Name of the faculty :** | Linda Varghese & Dr. Sandhya Dubey |
| **No of contact hours/week:** | |  |  |  |  | | --- | --- | --- | --- | | **L** | **T** | **P** | **C** | | 0 | 1 | 3 | 1 | |

**Course Outcomes (COs)**

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|  | ***At the end of this course, the student should be able to:*** | **No. of Contact Hours** | **Marks** |
| CO1: | Demonstrate the working of basic searching, sorting algorithms, and recursion | 02 | Marks |
| CO2: | Demonstrate the memory representation of data structures like sparse matrices and polynomials | 02 | Marks |
| CO3: | Demonstrate data structures like stack, queue, circular queue, linked lists, trees and graphs | 05 | Marks |
| CO4: | Apply the data structure stack to solve some probelms | 02 | Marks |
| CO5: | Demonstrate the working of advanced sorting methods | 01 | Marks |
|  | **Total** | 12 | 100 |

**Assessment Plan**

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| 1. **Continuous Evaluation** | 60% |
| 2 evaluations of 10 marks each : 20 marks 2 quizzes of 10 marks each: 20 marks 1 Execution check(Lab exercises) : 10 marks 1 Viva : 5 marks Observation Book: 5 marks | |
| 1. **Lab Examination** | 40% |
| * 2 questions of 20 marks each | |

**Lesson Plan**

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| **L. No.** | **Topics** | **Course Outcome Addressed** |
| **L1** | Mapping of 2-D arrays to 1-D arrays: 1. Obtain the Row-major and Column-major representation of the given input matrix. 2. Map the following 2-D arrays (matrices) to 1-D arrays (lists).  a) Upper triangular matrix  b) Lower triangular matrix  c) Diagonal matrix  d) Tri-diagonal matrix  e) Row-major  f) Column-major  Display the element at any specified position (row, column). | CO2 |
| **L2** | 1. Represent a sparse matrix using 1-D array. Use this 1-D array to reconstruct the original matrix. 2. Represent a polynomial using 1-D array and perform addition operation on two polynomials. | CO2 |
| **L3** | Solving problems using Recursion:  a) Tower of Hanoi for n disks(Recursion application)  b) Factorial of a given number  c) GCD of 2 numbers  d) Fibonacci series upto nth term | CO1 |
| **L4** | 1) Implementation of Stack using arrays 2) Conversion of Infix expression to Postfix expression (using stack) 3) Conversion of Infix expression to Prefix expression (using stack) | CO3,CO4 |
| **L5** | 1) Evaluation of Postfix expression 2) Evaluation of Prefix expression | CO3,CO4 |
| **L6** | 1) Implementation of Queue using arrays 2) Implementation of Circular Queue using arrays | CO3 |
| **L7** | 1) Implement a sorted singly linked list. Include the following options: inserting a node, deleting a node and displaying the list. 2) Reverse a singly-linked list using recursion. 3) Implementing stack using Singly linked list. 4) Implementing queue using Singly linked list | CO3 |
| **L8** | 1) Implement a sorted doubly linked list. Include the following options: inserting a node, deleting a node and displaying the list in both directions. 2) Create a binary search tree and traverse it in preorder, inorder and postorder traversal methods | CO3 |
| **L9** | 1.Represent a directed graph in the following ways:  a) Adjacency matrix  b) Adjacency list 2.) Represent an undirected graph in the following ways:  a) Adjacency matrix  b) Adjacency list | CO3 |
| **L10** | Implement the following sorting techniques. (a) Quick sort (b) Bubble sort (c) Selection sort (d) Insertion sort | CO3, CO5 |
| **L11** | 1. Merge Sort 2. Implement the following searching techniques. a) Sequential search. b) Binary search (Iterative method). c) Binary search (Recursive method). | CO3, CO5 |
| **L12** | End-Semester Laboratory Examination | - |
| **L13** | Click or tap here to enter text. | CO |
| **L14** | Click or tap here to enter text. | CO |

**References:**

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| 1. | Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, “Data Structures and Algorithms”, 4th Edition, Addison Wesley, 2009. |
| 2. | Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein “Introduction to Algorithms”, 3rd Edition, PHI Publications, 2009. |
| 3. | Sartaj Sahani, “Data Structures, Algorithms and Applications in C++”, 2nd Edition, Universities Press, 2005. J. P. Trembley and Sorenson, “An Introduction to Data Structures with Applications” 2nd Edition, 36th Reprint, McGraw Hill, 2008. |
| 4. | J. P. Trembley and Sorenson, “An Introduction to Data Structures with Applications” 2nd Edition, 36th Reprint, McGraw Hill, 2008. |
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| **Submitted by:** | Linda Varghese |

**(Signature of the faculty)**

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| **Date:** | 15-01-2024 |

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| **Approved by:** | Dr. Radhika M Pai |

**(Signature of HOD)**

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| **Date:** | 15-01-2024 |

**Faculty members teaching the course (IF MULTIPLE sections EXIST):**

|  |  |  |  |
| --- | --- | --- | --- |
| **FACULTY** | **Section** | **FACULTY** | **Section** |
| Linda varghese | A |  |  |
| Archana H | B |  |  |
| Dr.Sandhya Dubey | C |  |  |
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