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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 lab & DSE-2142 |
| **Semester & branch :** | III & DSE |
| **Name of the faculty :** | Linda Varghese, Dr. Sandhya Dubey,Dr.Shraventreva |
| **No of contact hours/week:** | |  |  |  |  | | --- | --- | --- | --- | | **L** | **T** | **P** | **C** | | 3 | 0 | 0 | 3 | |

**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: | Identify appropriate data structure | 3 | 15 |
| CO2: | Interpret the working of searching and sorting techniques | 6 | 15 |
| CO3: | Demonstrate the working of linear and non-linear data structure | 18 | 35 |
| CO4: | Make use of preliminary structures to implement various applications | 9 | 35 |
| CO5: | Click or tap here to enter text. | Hrs. | Marks |
|  | **Total** | 36 | 100 |

**Assessment Plan**

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| 1. **Continuous Evaluation** | 60% |
| 1. 2 regular evaluations which will be carried out in 5/6th and 10/11th week. Each evaluation is for 20 marks of which will have the following split up: Record: 6 Marks; Quiz : 7 Marks; Execution: 7 Marks; Total = 20\*2 =40 Marks 2. Mid evaluation =20 marks(writeup+execution of programs)  Total Internal Marks: 3\* 20 =60 Marks | |
| 1. **Lab Examination** | 40% |
| * Examination of 2 hours duration (Max. Marks: 40). Program Write up: 15 Marks; Program Execution: 25; MarksTotal: 15+25 =40 Marks | |

**Lesson Plan**

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| **L. No.** | **Topics** | **Course Outcome Addressed** |
| **L1** | **1. Define a class EMPLOYEE contains following members.   Data members: Employee\_Number, Employee\_Name, Basic, DA, IT, Net\_Sal, Gross\_salary. Member functions: To read the data, calculate net salary, gross salary and display both salary. Write a C++ program to read the data of N employees and compute Net salary and Gross salary of each employee. (DA= 12% of Basic and Income Tax (IT) = 18% of the gross salary).   2. Create a flight class that has private data members: flight number (integer), destination(characters), distance (float), fuel (float).  a) Initialize fuel to 13.2 liters b) Provide a parameterized function that accepts fuel details c) Private Member functions: calculate\_fuel() to calculate the value of Fuel as per the following criteria:  Distance (in kilometers) Fuel (in liters)  <=1000 500  >1000 and <=2000 1100  >2000 2200  d) Member functions: information\_entry() to allow user to enter values for flight number, destination, distance which calls function calculate\_fuel() to calculate the quantity of fuel and display\_info() to allow user to view flight details.   Additional questions:-  1). Check if a given number is prime or not 2). Factorial of given 10 numbers (do not use arrays) 3). Print all odd numbers between m and n 4). Menu driven program to sum all elements entered upto -1 5). Print triangle in the following form using loops until n.   Ex. If n=6   1  2 3  4 5 6** | CO1 |
| **L2** | **1****. Mapping of 2-D arrays to 1-D arrays:  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).   2. Representation of a Sparse Matrix:-  Represent a sparse matrix using 1-D array. Use this 1-D array to reconstruct   the original matrix.  Additional Questions:  1) Define a class time with data members hour, min, sec .Write the user defined functions to (i) Add (ii) To find difference between two objects of class time. Functions take two time objects as argument and return time object. Also write the display and read function** | CO1 |
| **L3** | **1. Representation of a Polynomial:-  Represent a polynomial using 1-D array and perform addition operation on   two polynomials.  2. Write a program to perform following string operations without using string   handling functions:  a) length of the string   b) string concatenation   c) string comparison   d) to insert a sub string   e) to delete a substring  Additional Questions:  1). Write a program to subtract two polynomials. 2). Write a program to find the transpose of a sparse matrix represented using   array of objects.** | CO3 |
| **L4** | **1. Solving problems using Recursion:  a) Factorial of a given number  b) GCD of 2 numbers  c) Fibonacci series upto nth term  d) Tower of Hanoi for n disks  Additional questions:   1) Write a program to find the length of a string using recursion  Display the element at any specified position (row, column).** | CO3 |
| **L5** | **1. Implementation of Stack using arrays  2. To check if the given parenthesized expression has properly matching open   and closing parenthesis 3. To check a given string is palindrome or not using stack  Additional Questions: 1). Write a program to Check whether a given String is Palindrome or not using Recursion 2). Write a program to copy one string to another using Recursion** | CO3 |
| **L6** | **1. Conversion of infix expression to postfix and prefix forms; 2. Evaluation of postfix and prefix expressions** | CO4 |
| **L7** | **1. Implementation of Queue using arrays 2. Implement a circular queue of Strings with functions insert, delete and display. 3. Write a program to implement the circular queue using arrays** | CO3 |
| **L8** | **1. Write a menu driven program to perform the following operations on linked list.  a) Insert an element in the beginning of the list  b) Insert an element at the end of the list  c) Insert an element before another element in the existing list  d) Insert an element after another element in the existing list  e) Delete a given element from the list  f) Print the list  2. Implement Stack and Queue using linked lists  Additional Questions:  1).Write the program which performs the following functions:  a) Reverse the list  b) Sort the list  c) Delete every alternate node in the list  d) Insert an element in a sorted list such that the order is maintained** | CO4 |
| **L9** | **1. Write a menu driven program to perform the following on a doubly linked list  a) Insert an element at the rear end of the list  b) Delete an element from the rear end of the list  c) Insert an element at a given position of the list  d) Delete an element from a given position of the list  e) Insert an element after another element  f) Insert an element before another element  g) Print the list  2. Write a program to add two polynomials using doubly linked list.  Additional Questions  1). Write a program to perform insertion and deletion operation in circular doubly linked list.** | CO4 |
| **L10** | **1. Write user defined functions to perform the following operations on binary trees:  a) create a binary tree  b) In order traversal (recursive)  c) Post order traversal (recursive)  d) Preorder traversal (recursive)  e) Count the number of leaf nodes in a binary tree  2. Write a program to perform the following:  a) Print the parent of the given element  b) Print the depth of a tree  c) Print the ancestors of a given node  3. Write a program to construct and search for a given element in a binary search tree.  Additional Questions:  1). Write a program to implement level order traversal on binary search tree 2). Write a program to insert and delete an element in a binary search tree. 3). Write a program to search for a given element using Depth first search traversal.** | CO3 |
| **L11** | **1. Linear Search and Binary searching 2. Sorting: Bubble, Quick, Selection & Insertion 3. Represent the graph using adjacency list and adjacency matrix 4. Heapsort and mergesort  Additional Questions:  1). Write a program to perform BFS and DFS in a given Graph 2). Write a program to construct expression tree from the given expression. (infix, prefix, postfix)** | CO2 |
| **L12** | **End Semester Examination** | CO |
| **L13** | Click or tap here to enter text. | CO |
| **L14** | Click or tap here to enter text. | CO |

**References:**

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| 1. | Ellis Horowitz, SartajSahni, Dinesh Mehta, Fundamentals of Data Structures in C++, 2nd Edition, GalgotiaPublications, Reprint 2013 |
| 2. | Behrouz A Foruzan, Richard F Gilberg, A Structured Programming Approach using C, 3E, Cengage, Learning India Pvt Ltd. India 2007 |
| 3. | Behrouz A. Forouzan, Richard F. Gilberg, Data Structures, A Pseudocode approach Using C, 2e, Cengage, learning India Pvt.Ltd, India, 2009. |
| 4. | Ellis Horowitz, Sartaj Sahni, Dinesh Mehta, Fundamentals of Data Structures in C, 2nd Edition Univertsities Press (India) Private Limited, Reprint, 2013 |
| 5. | Debasis Samanta, Classic Data structures- 2nd edition, PHI Learning Private Limited , 2010 |
| 6. | Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, 2nd Edition, Pearson Education, 2005. |
| 7. | Michael T, Goodrich, Roberto Tamassia, David Mount, Data Structures and Algorithms in C++, 2nd Edition, John Wiley & Sons, 2011 |

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| **Submitted by:** | Mrs. Linda Varghese & Dr. Sandhya Dubey |

**(Signature of the faculty)**

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| **Date:** | 31-07-2023 |

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

**(Signature of HOD)**

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| **Date:** | 31-07-2023 |

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

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| **FACULTY** | **Section** | **FACULTY** | **Section** |
| Linda Varghese | A |  |  |
| Dr. Sandhya Dubey | B |  |  |
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