**DAYANANDA SAGAR COLLEGE OF ENGINEERING**

An Autonomous Institute Affiliated to VTU, Belagavi Approved by AICTE ; ISO 9001:2015 Certified  
 Accredited by National Assessment Accreditation Council (NAAC) with ‘A’ grade  
 Shavige Malleshwara Hills, Kumaraswamy Layout, Bengaluru-560078

**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING**

**DESIGN AND ANALYSIS OF ALGORITHMS WITH APPLICATIONS An Integrated Laboratory**

Course code: 21CS43 Credits: 01

L: T: P: S: 3:0:2:0 CIE Marks: 50

Exam Hours: 03 SEE Marks: 50

**Course Outcomes: At the end of the laboratory course, student will be able to:**

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| CO1 | Apply and implement major algorithm design techniques to solve problems and analyze time complexity of those problems. |
| CO2 | Synthesize efficient algorithms in common engineering design situations |
| CO3 | Describe the different algorithm design paradigms and explain when an algorithmic design situation calls for it. |
| CO4 | Write correctness proofs for the algorithms. |
| CO5 | Demonstrate familiarity with major algorithms and the related data structures. |
| CO6 | Apply algorithmic design paradigms and methods of analysis. |

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| **Expt**  **No.** | **Contents of the Experiment** | **Hours** | **CO’S** |
| 1 | Write and execute a program to sort a given set of elements using the Quick sort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements should be read from a file/can be generated using the random number generator | 02 | CO1 |
| 2 | Write and execute a program to sort a given set of elements using the Merge sort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements should be read from a file/can be generated using the random number generator | 02 | CO1 |
| 3 | a. Write and execute a program to print all the nodes reachable from a given starting node in a graph using DFS method. | 02 |  |
| b. Write and execute a program to print all the nodes reachable from a given starting node in a graph using BFS method. |
| 4 | a. Write and execute a program to arrange nodes in topological order using DFS method. | 02 |  |
| b. Write and execute a program to arrange nodes in topological order using source removal technique. |
| 5 | Write and execute a program to search for the given pattern string in given text string using Horspool String Matching algorithm. | 02 |  |
| 6 | Write and execute a program for matrix chain multiplication for the given the sequence of  Matrices <A1, A2. . . . . An> |
| 7 | Write and execute a program to find a longest-common-subsequence of X and Y using dynamic programming for given two sequences X = <x1, x2. . . . . xm> Y = <y1 y2. . . . .yn> | 02 |  |
| 8 | Write and execute a program to find Minimum Spanning Tree using Prim’s method |
| 9 | Write and execute a program to find Minimum Spanning Tree using Kruskal’s method | 02 |  |
| 10 | Write and execute a program to find shortest path to all other nodes in weighted graph using Dijkstra’s strategy |
| 11 | Write and execute a program to find a subset of a given set S = {s1, s2,…..,sn} of n positive integers whose sum is equal to a given positive integer d. For example, if S={1, 2, 5, 6, 8} and d = 9 there are two solutions {1,2,6} and {1,8}. A suitable message is to be displayed if the given problem instance doesn’t have a solution | 02 |  |
| 12 | Write and execute a program to find solution to n- queens problem | 02 |  |

**Text Books:**

1. AnanyLevitin: Introduction to the Design & Analysis of Algorithms, 3rdEdition, Pearson Education, 2012.
2. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran: Fundamentals of Computer Algorithms, 2nd Edition, Universities Press.2

**Reference Books:**

1. Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein: Introduction to Algorithms, 3rd Edition, PHI, 2010.
2. Kenneth A. Berman, Jerome L. Paul: Algorithms, Cengage Learning, 2002.