Course Type	Course Code	Name of Course	L	T	P	Credit
ESC2	NCSE102	Introduction to Algorithms	3	0	0	3

Course Objective
The objective of the course is to present an introduction to fundamentals of algorithm design and analysis

Learning Outcomes
Upon successful completion of this course, students will: ● Understand the relationship between an algorithm and a computer program   ● Learn analysis techniques and performance measures used for algorithms   ● Learn various paradigms of designing of algorithm

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	**Introduction:** The role of algorithms in computing, Characteristics of a good algorithm, Algorithm design, Pseudo code	3	Learning about basics of algorithms, design of algorithms, and description of algorithms
2.	**Analysis of Algorithms**: Time and Space Complexity of an algorithm, Asymptotic notations to represent complexity of an algorithm	3	Learning analysis techniques and performance measures for algorithms
3.	**Divide and Conquer:** General strategy of divide and conquer paradigm, Recurrence relations and their solutions, Binary Search, Quick Sort and Merge Sort, Order Statistics, Matrix Multiplication	10	Learning about divide and conquer paradigm of designing of algorithm
4.	**Greedy Algorithms:** General strategy of greedy algorithm paradigm, Fractional knapsack, Minimum Spanning Tree, Shortest Path (Dijkstra's Algorithm), Activity Selection, Optimal Merge Patterns	9	Learning about greedy algorithm paradigm for designing of algorithm
5.	**Dynamic Programming:** General Strategy of dynamic programming, Fibonacci Numbers, 0-1 knapsack problem, Edit distance, Longest Common Subsequence, Shortest Path (Bellman-Ford Algorithm, Floyd-Warshall Algorithm)	9	Learning about dynamic programming paradigm for designing of algorithm
6.	**Back Tracking:** General Strategy of backtracking paradigm, Depth First Search, 4-Queens Problem, Graph Coloring, Hamiltonian Cycle	4	Learning about fundamentals of backtracking technique
7.	**Branch-and-Bound:** Least Cost Search, 15-Puzzle Problem, 0-1 Knapsack, Subset Sum	4	Learning about fundamentals of branc and bound technique

Text Books:

1. Cormen, Leiserson, Rivest and Stein, Introduction to Algorithms, Prentice Hall of India.
2. E. Horowitz, S. Sahni, and S. Rajasekaran, Fundamentals of Computer Algorithms, Universities Press.

Reference Books:

1. J. Kleinberg and E. Tardos, Algorithm Design, Pearson Education.