PE-CS-T307A	Advanced Algorithms						
Lecture	**Tutorial**	**Practical**	**Credit**	**Major Test**	**Minor Test**	**Total**	**Time**
3	**0**	**0**	**3**	**75**	**25**	**100**	**3 Hrs.**
Purpose	To introduce advanced algorithm concepts and their implementation for solving complex applications.						
Course Outcomes(CO)							
CO1	Learn the basic concepts of Algorithms and their analysis.						
CO2	Study the concept of dynamic programming and various advanced data structures.						
CO3	Learn various graph algorithms.						
CO4	Study various Flow and Sorting Networks.						

UNIT – I: Introduction

Algorithms and its complexity (Time and Space), Algorithm Analysis (Worst, Best & Average case), Pseudocode Conventions, Asymptotic Notations, Binary Search Trees.
Recurrence Relation:- Methods for solving Recurrence(Substitution, Recursion Tree , Master Theorem).

UNIT – II: Advanced Design Techniques

Dynamic Programming:- Elements, Matrix-chain multiplication, longest common subsequence.
Greedy Algorithms:- Elements, Activity Selection problem, Huffman codes, Task scheduling problem, Knapsack Problem, .
Probabilistic analysis concepts, Hiring Problem and its probabilistic analysis.

UNIT – III: Graph Algorithms

Review of Graph Algorithms:- Traversal methods(Depth first and Breadth first search), Topological sort, Strongly connected components, Minimum Spanning Trees- Kruskal and Prims, Single Source shortest path, Relaxation, Dijkstra's Algorithm, Bellman-Ford Algorithm, Single source shortest path for directed acylic graphs, All pair shortest path- Floyd Warshall Algorithm.

UNIT – IV: String Matching Algorithms

The Naïve string-matching algorithm, Rabin-Karp Algorithm, String matching with finite automata, Knuth-Morris-Pratt Algorithm.

Suggested Books:

1. L.K. Vermani, S. Vermani, An Elementary Approach to Design and Analysis of Algorithms, World Scientific, 2019
2. Cormen, Leiserson and Rivest : Introduction to Algorithms, 3/e, PHI
3. Harsh Bhaisn, Algorithms: Design And Analysis Oxford University Press,2015.
4. Aho, Hopcroft and Ullman : The Design and Analyses of Computer Algorithms. Addison Wesley.
5. R.B.Patel& M.M.S Rauthan, Expert Data Structures with C++, Khana Publications, Delhi , India, 2ndEdition 2004,ISBN : 87522-03-8.
6. Horowitz, Ellis and Sahni, Sartaj : Fundamentals of Computer Algorithms, Galgotia Publications