JYOTI NIVAS COLLEGE AUTONOMOUS

SYLLABUS FOR 2018 BATCH AND THEREAFTER

Programme: B.C.A **Semester: IV**

DESIGN AND ANALYSIS OF ALGORITHMS

Course Code: 18BCAIVT2 **No. of Hours: 60**

COURSE OBJECTIVES:

- Ability to analyze the performance of algorithms in terms of their time and space complexities.
- Reinforce basic design concepts (e.g., pseudocode, specifications, top-down design)
- To understand the different algorithm designing technique for solving problems.
- Assess how the choice of data structures and algorithm design methods impacts the performance of programs.
- Solve problems using algorithm design strategies like the greedy method, divide and conquer, dynamic programming, backtracking, and branch and bound etc.

LEARNING OUTCOMES:

- At the end of the course students will be able to develop their own versions for a given computational task and to compare and contrast their performance with respect to time and space.
- The ability to choose the best possible model from a set of different algorithms and data structures so as to minimize the overall cost incurred.

UNIT- I **11 HRS**

Introduction: Algorithm Specification-Simple example of design and analysis of time complexity-Performance Analysis: Space Complexity and Time complexity, Asymptotic Notation - Polynomial Vs Exponential Algorithms.

UNIT - II **13 HRS**

Divide and Conquer algorithm: Introduction to Divide and Conquer Algorithms - Master Theorem – Sorting - Insertion Sort, Merge Sort using links, Quick Sort- Analysis of linear and binary search algorithm**.**Horner's method of evaluation a polynomial at a given point, Strassen's Matrix Multiplication.

UNIT III **13 HRS**

Dynamic programming: Design and analysis, Computing a Binomial Coefficient, Multistage graphs**,** Traveling salesman problem.

Greedy approach: General method, Dijkstra's Algorithm, Knapsack problem, Minimum cost Spanning trees, Single source shortest path problem.

UNIT IV **12 HRS**

Back tracking: General method - Sum of subsets - 4-Queen Problem using backtracking.

Branch and Bound method- 4-queens - Least Cost Search, Traveling Salesman problem using Branch and Bound method.

UNIT V **11 HRS**

Limitations of Algorithm- Introduction to lower bound theory, Decision trees, Introduction to P, NP and NP complete problems, NP hard problems.

REFERENCES:

1. Ellis Horowitz, SartajSahniSanguthevarRajasekaran. Fundamentals of Computer Algorithms. Universities Press (India) Private Limited. Second edition.
2. AnanyLevitin. Introduction to the design and Analysis of Algorithms. Dorling Kindersley (India) Pvt.Ltd. Second edition
3. Gav PAI, Data Structures and Algorithms, Tata McGraw Hill, Jan 2008.
4. Donald E. Knuth. The art of Computer Programming,*Volume 1: Fundamental Algorithms.*Addison Wesley.