B. E. III YEAR (4YDC)
SEMESTER-B
CO 34563: DESIGN & ANALYSIS OF ALGORITHMS

*Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	2	3	1	70	30	60	40	200

PRE-REQUISITES: CO24507: Data Structures

COURSE OBJECTIVES: Analyze the asymptotic performance of algorithms. Demonstrate a familiarity with major algorithms and data structures. Apply important algorithmic design paradigms and methods of analysis. Design efficient algorithms for common engineering design situations.

COURSE OUTCOMES:
After completing the course student should be able to:

CO1. Understand meaning of complexity of an algorithm & various notations to represent time complexity.

CO2. Apply and evaluate different algorithm design techniques for getting the effective solutions of specified problems.

CO3. Design and analyze different algorithms with its applications.

CO4. Explain computability and non-computability and various complexity classes, and approaches to solve complex problems.

COURSE CONTENTS:
THEORY:

UNIT 1 Review of elementary Data Structures: Stacks, Queues, Lists, Trees, Hash, Graph. Internal representation of Data Structures, Code tuning techniques: Loop Optimization, Data Transfer Optimization, Logic Optimization, etc.

UNIT 2 Definitions of complexity, Time and Space Complexity; Time space tradeoff, various bounds on complexity, Asymptotic notation: O-notation, Ω-notation, Θ-notation, Recurrences and Recurrences solving techniques: Recursion-tree method and Master method, Average time analysis methods: Probabilistic methods. Amortized analysis.

UNIT 3 Design and analysis of algorithms using the brute-force, greedy, dynamic programming, divide-and-conquer and backtracking techniques.

UNIT 4 Algorithm for sorting and searching, string matching algorithm, Number-theoretic algorithms, linear programming, Matrix Manipulation algorithms, tree and Graph Algorithms.

UNIT 5 NP-hard and NP-complete problems, Approximations Algorithms, Data Stream Algorithms, Introduction to design and complexity **analysis** of Parallel Algorithms **using CUDA programming.**

COURSE ASSESSMENT (Th.):

1. Internal Assessment for continuous evaluation, mid-term tests, Tutorials, Quizzes, Class Performance, etc. (30%).
2. End semester Theory Exam (70%).

COURSE ASSESSMENT (Pr.):

1. Internal Assessment for continuous evaluation (40%): Lab assignments, demonstration, Viva, file etc.

2. End semester Practical Exam (60%): Quiz/Programming test, lab journal, demo, viva etc.

TEXT BOOKS RECOMMENDED:

1. Cormen, Leiserson, Rivest, Stein, "Introduction to Algorithms", Second Edition, Prentice Hall of India, 2001.
2. Aho A.V., Hopcroft J.E., J. Ullman, "Design and Analysis of Computer Algorithms", Addison Wesley, 1998.
3. Horowitz E. and Sahani, "Fundamentals of Computer Algorithms", Galgotia Publications, 1984.

REFERENCE BOOKS:

1. Knuth D., "Fundamental algorithms: The Art of Computer programming", Volume – I, Third Edition, Pearson Education 1998.
2. Knuth D., "Sorting and Searching: The Art of Computer programming", Volume – III, Second Edition Pearson Education 1998.
3. John Kleinberg, Trades E., "Algorithm Design", Pearson Education 2002.
4. A. Papoulis, S.U. Pillai, "Probability, Random Variables and Stochastic Processes", McGraw Hill, Fourth Edition 2006.
5. Goodrich Michael T., R. Tamassia, "Algorithms Design", Willy Publication

COURSE ASSESSMENT POLICIES (Tentative):

CLASS WORK(CW) ASSESSMENT

Test - 01	15 %
Test - 02	15 %
Test - 03	15 %
Tutorials Sheets	15 %
Surprise Quzzies	40 %
Attendance	00 %

PRACTICAL WORK(SW) ASSESSMENT

Programming Assignments with analysis	40%
Demos	40%
Viva	10%
Files	10%
Attendance	00%