DARBHANGA COLLEGE OF ENGINEERING
DARBHANGA

COURSE FILE OF
DESIGN AND ANALYSIS OF ALGORITHMS
(PCC CS 404)

DEPARTMENT
OF
COMPUTER SCIENCE AND ENGINEERING

FACULTY NAME
MR. ANAND KAMAL
(Assistant Professor)

Vision of the Department:

To bring forth cultured graduates meeting the expectation of national and multi-national industries exceling in the field of computing as well as in higher studies and research.

Mission of the Department:

1. To provide strong theoretical knowledge of computer science with practical training which meets the industries expectations.

2. To train necessary skills to further higher studies and professional growth.

3. To inculcate ethical valued in graduates through various social-cultural activities.

Program Edudcational Objectives (PEOs) :

1. Students will be able to effectively communicate, understand the problems of industries, environment, society and endeavor to find the solutions with high ethical responsibilities.

2. Students will be able to engage in life-long learning, pursue higher studies and contribute to the evolving research & development.

3. Students will be able to demonstrate their professional skills and leadership roles across multi-disciplinary domains.

Program Specific Outcomes (PSOs) :

1. Students should be able to develop and test sustainable cost effective software for automization in businees application and society.

2. Students should be able to use new technologies and tools for executing multi-disciplinary projects.

Program Outcomes (POs):

PO 1: *Engineering Knowledge : An ability to apply knowledge of computing and mathematics which is appropriate to computer science.*

PO 2: Problem analysis: *An ability to identify, formulate, and develop solutions to computational challenges.*

PO 3: Design/development of solutions: An ability to design, implement, and evaluate a computational system to meet the desired soluitions of problem with feasibility.

PO 4: Conduct investigations of complex problems: Use research-based knowledge and methods including design of experiments, analysis and interpretation of data, and synthesis them to get the valid conclusions.

PO 5: Modern tool usage: An ability to use appropriate techniques, skills, and tools necessary for computing practice and makes human effort less.

PO 6: The engineer and society: An ability to analyze impacts of computing on individuals, organizations, and society.

PO 7: Environment and sustainability: Understand the impact of the professional engineering solutions on society in environmental contexts, and provide a solution for sustainable development.

PO 8: Ethics: An understanding of professional, ethical, legal, security, and social issues and responsibilities for the computing profession.

PO 9: Individual and team work: An ability to function effectively on teams to accomplish shared idea, computing design, evaluation, or implementation goals.

PO 10: Communication: An ability to communicate and engage effectively with diverse stakeholders.

PO 11: Project management and finance: An ability to apply design and development principles in the construction of software systems of varying complexity.

PO 12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course Objectve:
1. The objective of the course is student can demonstrate different designe strategies of Algorithm.
2. Student can be able to choose a particulae designe strategy for particular problem,

Course Outcome:

CO1: Student should able to distinguish which algorithm is time and space efficient assymptotically.
CO2: Student should be able to find the space and time efficient sorting and searching strategy.
CO3: Student should by able to analyze the different designe strategy of algorithm.
CO4: Student should be able to apply a designe strategy of algorithm to solve a particular problem.
CO5: Understanding of NP- Complete and randomized algorithm.

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	2	2	-	-	-	-	-	-	-	-	3	-
CO2	2	3	2	2	-	-	-	-	-	-	-	-	3	-
CO3	2	3	3	3	-	-	-	-	-	-	-	-	3	2
CO4	2	2	3	3	-	-	-	-	-	-	2	-	2	-
CO5	2	2	2	3	-	-	-	-	-	-	-	-	-	-

Low : 1 Substantial : 2 High : 3

Syllabus AKU:
05 1X06
DESIGN AND ANALYSIS OF ALGORITHMS L-T-P : 3-0-0 Credit : 3

Introduction : Algorithm, performance evaluation of algorithms, space & time complexity, notion of optimality.

Divide and Conquer : Finding the maximum and minimum- Quick Sort – Selection- Strassen's matrix multiplication etc.

Greedy Algorithm : Knapsack Problem, (Knapsack, Fractional Knapsack), Activity selection problem, Huffman's Codes, Minimum Spanning Tree, Kruskal's Algorithm, prim's Algorithm, dijkstra's Algorithm, etc.

Dynamic Programming : Knapsack problem DP solution, Activity selection problem DP solution. All pairs
shortest paths, Travelling salesman problem.

Randomized Algorithms and Amortized Analysis : Basics ideas of randomized Algorithms (Las Vegas and
Monte Carlo types), Simple examples (Randomized Quick sort and its analysis, Min-cut algorithm and its analysis),
Amortized analysis and its significance (Illustration through examples).

Graph Algorithms : Breadth First Search (BFS), Depth First Search (DFS), Strongly Connected Components.
Euler Tour, Minimum Spanning Tree, Kruskal's Algorithm. Prim's algorithm. Single Source Shortest Path.

Introduction to NP-Completeness : Basic concepts.

Text Books:
1. Introduction to Algorithm, 2e, by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, PHI.

Reference Books:
1. Fundamentals of Computer Algorithms by E. Horowitz and S. Sahni, Galgotia.
2. The design and analysis of computer algorithms by A.V. Aho, J.E. Hopcroft and J.D Ullman, Pearson Education.
3. Algorithm Design, by Kleinberg and Tardos, Pearson

GATE Syllabus

Searching, sorting, hashing. Asymptotic worst case time and space complexity. Algorithm design techniques: greedy, dynamic programming and divide-and-conquer. Graph search, minimum spanning trees, shortest paths.