CSEN3001	DESIGN AND ANALYSIS OF ALGORITHMS	L	T	P	S	J	C
		3	0	0	0	0	3
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

This course enables the students to gain knowledge in various techniques of designing algorithms, estimating the efficiency of the developed algorithms in terms of time and space. The knowledge gained in this course can be applied to the latest developments in technology.

Course Educational Objectives:

- Explain the asymptotic performance of algorithms.
- Demonstrate the complexity of an algorithm in terms of time and space.
- Help to design and implement programs in various programming paradigms.
- Familiarize with efficient algorithms in software design and development.

UNIT 1 Introduction to Algorithms 9 hours

Introduction to Algorithms: Algorithm specification, Performance Analysis. Divide and Conquer: The general method: Binary search, finding maximum and minimum, Merge sort, Quick sort, Selection, Strassen's Matrix multiplication.

UNIT 2 The Greedy Method 9 hours

The Greedy Method: The general method, Knapsack problem, Job sequencing with deadlines, optimal storage on tapes, minimum cost spanning trees, single source shortest paths.

UNIT 3 Dynamic Programming 9 hours

Dynamic Programming: The general method, multistage graphs, all pairs shortest paths, optimal binary search trees, reliability design, the travelling sales person problem.

UNIT 4 Basic search and traversing techniques 9 hours

Basic search and traversing techniques: Techniques for Binary trees, Techniques for Graphs, connected components and spanning trees, Bi-connected components, and depth first search. Back Tracking: The General Method, Eight Queens problem, Sum of subsets, Graph coloring, Hamiltonian cycle.

UNIT 5 Branch and Bound & Algebraic Problems 9 hours

Branch and Bound: The method, traveling sales person problem, 0/1 knapsack problem, efficiency considerations.

Algebraic Problems: The general method, Evaluation and Interpolation.

TextBooks:

1. Ellis Horowitz, S. Sahni, Fundamentals of Computer Algorithms, 2/e, University Press, 1984.
2. Thomas H. Cormen, Charles E. Leiserson, Introduction to Algorithms, et.al., 3/e, MIT Press, 2012.

References:

1. Aho, Hopecraft, Ullman, The Design and Analysis of Computer Algorithms, 1/e, 2002.
2. Michel T. Goodrich & Roberto Tamassia, Algorithm Design: Foundations, Analysis, and Internet Examples, 1/e, John Weily and Sons, 2001.
3. Sara Baase, Allen Van Gelder, Computer Algorithms: Introduction to Design and Analysis, 3/e, Pearson Education, 1999.
4. Mark Allen Weiss, Data Structures and Algorithm Analysis in JAVA, 3/e, Pearson Education, 2011.
5. Jon Kleinberg, Eva Tardos, Algorithm Design, 1/e, Pearson, 2013.

Course Outcomes:

After successful completion of the course the student will be able to:

1.define algorithm

2. compare various methods of designing algorithms

3. illustrate the merits and demerits of different designing techniques

4. identify best method to develop an algorithm

5. evaluate the algorithms in terms of efficiency

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3		1	1	1	1						1	3	3	
CO2	1	2	3	1	1			1	1		1		1	3	
CO3	1	2	3	1	1						1		2	3	
CO4	2	2	3	1	1			1	1				2	3	
CO5	3	2	3	1	1			1			1		2	3	

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS : 06-09-2021 **ACADEMIC COUNCIL: 01-04-2022**

SDG No. & Statement: SDG 8 “Economic growth”: In an increasingly automated world with computers, writing efficient algorithms can help solve several problems such as logistics, planning etc., leading to economic growth

SDG Justification: