Analysis and Design of Algorithm

School: SET		**Batch : 2019**	
Program: M.Tech		**Current Academic Year: 2019-2021**	
Branch: Data Science		**Semester: I**	
1	Course Code	**CSE 611**	Course Name: **Analysis and Design of Algorithm**
2	Course Title	**Analysis and Design of Algorithm**	
3	Credits	5	
4	Contact Hours (L-T-P)	3-1-2	
	Course Status	PG	
5	Course Objective	The objective of the course is to teach techniques for effective problem solving in computing. The use of different paradigms of problem solving will be used to illustrate efficient ways to solve a given problem. In each case emphasis will be placed on rigorously proving correctness of the algorithm. In addition, the analysis of the algorithm will be used to show the efficiency of the algorithm over the naive techniques.	
6	Course Outcome	1. **Analyze** the performance of algorithms. 2. **Apply** the Concept of Divide and Conquer method to solve real world problems. 3. **Demonstrate** the Dynamic programming techniques. 4. **Describe** the Concept of Greedy method to solve the real world problems of backtracking 5. **Explain** the various mathematical concepts and implement the pattern matching algorithms. 6.**Propose** algorithms to real life problems	
7	Course Description		

8	Outline syllabus		CO Mapping
	Unit 1	**Introduction**	
	A	Algorithm Design Paradigms- Motivation, Concept of algorithmic efficiency, Run time analysis of algorithms, Growth of Functions, Asymptotic Notations	CO1
	B	Growth of Functions, Asymptotic Notations Time Complexity for Iterative function	CO1
	C	Time Complexity of Recursive Function: Master's Method, Iteration Method & Recursion Tree Method.	CO1
	Unit 2	**Analysis of Divide and conquer Methodology**	
	A	Structure & Analysis of divide-and-conquer algorithms: examples-Binary search	CO2

B	Quick sort, Merge sort, Medians and Order Statistics	CO2,CO6	
C	i^{th} order statistics, Randomized Algorithms – Randomized Quick Sort	CO2,CO6	
Unit 3	**Analysis of Dynamic Programming Methodology**		
A	Overview, Difference between dynamic programming and divide and conquer	CO3,CO6	
B	Applications and analysis: Matrix Chain Multiplication, 0/1 Knapsack Problem	CO3,CO6	
C	All-pairs Shortest path in graphs, Longest Common Sub-sequence, Optimal Binary Search Tree.	CO3,CO6	
Unit 4	**Analysis of Greedy Method**		
A	Overview of the Greedy paradigm, Fractional Knapsack problem, Minimum spanning Trees	CO4,CO6	
B	Single source shortest paths, Task Scheduling Problem, Huffman Coding Algorithm	CO4,CO6	
C	Backtracking: Concepts and N-Queens Problem, Branch and Bound: Concepts and Sum of Subsets Problem	CO4,CO6	
Unit 5	**String Matching and Approximation Algorithms**		
A	Pattern Matching Algorithms: Rabin Karp Algorithm, Knuth Morris Pratt Algorithm, String Matching with Finite Automata	CO5,CO6	
B	Approximation Algorithms- Vertex Cover and Travelling Salesperson Problem, Turing's Halting Problem	CO5,CO6	
C	Theory of NP-Completeness: Introduction to Class-P, NP, NP- Hard & NP-Complete with examples.	CO5,CO6	
Mode of examination	Theory		
Weightage Distribution	CA	MTE	ETE
	30%	20%	50%
Text book/s*	1. Cormen et al, "Introduction of Computer Algorithm", Prentice Hall India.		
Other References	1. Sahni et al, "Fundamentals of Computer Algorithms", Galgotia Publication. 2. Internet as a Resource for Reference.		

CO and PO Mapping

S. No.	Course Outcome	Program Outcomes (PO) & Program Specific Outcomes (PSO)
1	**Analyze** the performance of algorithms	PO1,PO2,PO4 ,PO8,PSO2
2	Apply the Concept of Divide and Conquer method to solve real world problems.	PO1,PO2,PO4,PO8,PSO2
3	Demonstrate the Dynamic programming techniques.	PO2 ,PSO2
4	**Describe** the Concept of Greedy method to solve the real world problems of backtracking	PO2,PO3,PO4 ,PSO2
5	Explain the various mathematical concepts and implement the pattern matching algorithms.	PO1,PO2,PO4,PSO2
6	Propose solutions to real life world problems	PO2,PO3 ,PO6,PO8,PSO1,PSO2

PO and PSO mapping with level of strength for Course Name "Analysis and Design of Algorithm" (Course Code CSE 611)

Course Code_ Course Name	COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CSE611_ Analysis and Design of Algorithm	CO1	2	3		1				1		2	
	CO2	3	2		2				1		1	
	CO3		1								3	
	CO4		3	2	3						1	
	CO5	2	3		2						1	
	CO6		2	2					2	1	3	

Average of non-zeros entry in following table (should be auto calculated).

Cou	Cours	P	P	P	P	P	P	P	P	PS	PS	PS

rse Code	e Name	O1	O2	O3	O4	O5	O6	O7	O8	O1	O2	O3
CSE 611	Analysis and Design of Algorithm	2.33	2	2	1.5	1.3			1.3	1	1.7	

Strength of Correlation

1. Addressed to *Slight (Low=1) extent*   *2.* Addressed to *Moderate (Medium=2) extent*
3. Addressed to *Substantial (High=3) extent*