Analysis of Algorithm Introduction

VISION:

To established outcomes based excellence in teaching, learning and commitment to support IT industry.

MISION:

M1: To provide outcome based education

M2: To provide fundamental & intellectual knowledge with essential skills to meet current and future need of IT Industry across the globe

M3: To inculcate the philosophy of continues learning, ethical values & Social Responsibility.

Program Outcomes (PO)

1. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems in IT.
2. **Problem analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences in IT.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations using IT.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions using IT.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations in IT.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice using IT.

7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development in IT.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice using IT.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings in IT.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project Management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage IT projects and in multidisciplinary environments.
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 changes needed in IT.

Program Educational Objectives (PEO)

The PEOs of the B.Tech. (IT) program are:

1. To enrich students with fundamental knowledge, effective computing, problem solving and communication skills enable them to have successful career in Information Technology.
2. To enable students in acquiring Information Technology's latest tools, technologies and management principles to give them an ability to solve multidisciplinary engineering problems.
3. To impart students with ethical values and commitment towards sustainable development in collaborative mode.
4. To imbibe students with research oriented and innovative approaches which help them to identify, analyze, formulate and solve real life problems and motivates them for lifelong learning.
5. To empower students with leadership quality and team building skills that prepare them for employment, entrepreneurship and to become competent professionals to serve societies and global needs.

Program Specific Outcomes (PSO)

PSO1. Graduates of the program would be able to develop mobile and web based IT solutions for real time problems.

PSO2. Graduates of the program would be able to apply the concepts of artificial intelligence, machine learning and deep learning.

Course Outcome of Analysis of Algorithms (5IT4-05)

Class: B. Tech - 5th semester

	L	T	P
External Marks: 120			
Internal marks: 30	3	0	0
Total marks: 150			

CO1: Students would be able to describe, apply and analyze the complexity of certain divide and conquer method.

CO2: Students would be able to identify and analyze criteria and specifications appropriate to new problems of greedy method and dynamic programming.

CO3: Students would be able to identify and analyze branch and bound, pattern matching algorithms and assignment problem with specifications.

CO4: Students would be able to describe the Randomized algorithms, classes P, NP, and NP-Complete and be able to prove that a certain problem is NP-Complete.

Mapping Between CO and PO:

Pos / Cos	1	2	3	4	5	6	7	8	9	10	11	12
1	3	3	2	2	1	1	1	1	1	2	1	3
2	3	3	3	2	1	1	1	2	1	1	2	3
3	3	3	2	2	1	1	1	1	1	1	1	3
4	3	3	3	3	2	1	1	1	1	2	1	3

Mapping Between CO and PSO:

Cos	PSO1	PSO2
1	2	2
2	2	2
3	1	2
4	2	2

RTU Syllabus of Analysis of Algorithms (5IT4-05)

Credit: 3 **Max. Marks: 150(IA:30, ETE:120)**
3L+0T+0P **End Term Exam: 3 Hours**

SN	Contents	Hours
1	**Introduction:** Objective, scope and outcome of the course.	01
2	**Background**: Review of Algorithm, Complexity Order Notations: definitions and calculating complexity. **Divide And Conquer Method**: Binary Search, Merge Sort, Quick sort and Strassen's matrix multiplication algorithms.	06
3	**Greedy Method**: Knapsack Problem, Job Sequencing, Optimal Merge Patterns and Minimal Spanning Trees. **Dynamic Programming**: Matrix Chain Multiplication. Longest CommonSubsequence and 0/1 Knapsack Problem.	10
4	**Branch And Bound**: Traveling Salesman Problem and Lower Bound Theory. Backtracking Algorithms and queens problem. **Pattern Matching Algorithms**: Naïve and Rabin Karp string matching algorithms, KMP Matcher and Boyer Moore Algorithms.	08
5	**Assignment Problems:** Formulation of Assignment and Quadratic Assignment Problem. **Randomized Algorithms-** Las Vegas algorithms, Monte Carlo algorithms, randomized algorithm for Min-Cut, randomized algorithm for 2- SAT. Problem definition of Multicommodity flow, Flow shop scheduling and Network capacity assignment problems.	08
6	**Problem Classes Np, Np-Hard And Np-Complete:** Definitions of P, NP-Hard and NP-Complete Problems. Decision Problems.Cook's Theorem. Proving NP-Complete Problems - Satisfiability problem and Vertex Cover Problem. Approximation Algorithms for Vertex Cover andSet Cover Problem.	08
	Total	41

Lecture Plan of Analysis of Algorithms (5IT4-05)

Units	Topics	Lect. Req.
Unit-1 (7)	Objective Scope and Outcome of the subject	1
	Introduction of design and analysis of algorithms	1
	Complexity Analysis	1
	DIVIDE AND CONQUER METHOD: Binary Search, Linear Search	4
	Merge Sort	
	Quick sort	
	Stassen's matrix multiplication algorithms	
Unit-2 (10)	Order Notations: definitions and calculating complexity	6
	GREEDY METHOD: Knapsack Problem	
	Job Sequencing	
	Optimal Merge Patterns	
	Minimal Spanning Trees	
	DYNAMIC PROGRAMMING: Matrix Chain Multiplication	4
	Longest Common Subsequence	
	0/1 Knapsack Problem	
Unit-3 (8)	BRANCH AND BOUND: Traveling Salesman Problem and Lower Bound Theory	4
	Backtracking Algorithms and queens problem	
	Mid Term Paper Discussion	
	PATTERN MATCHING ALGORITHMS: Naïve pattern matching algorithms	1
	Rabin Karp string matching algorithms	1
	KMP Matcher	1
	Boyer Moore Algorithms	1
Unit-4 (8)	ASSIGNMENT PROBLEMS: Formulation of Assignment and Quadratic Assignment Problem.	3
	RANDOMIZED ALGORITHMS: Las Vegas algorithms, Monte Carlo algorithms	
	randomized algorithm for Min-Cut, randomized algorithm for 2-SAT	2
	Problem definition of Multicommodity flow, Flow shop scheduling	2
	Network capacity assignment problems	1
Unit-5 (8)	PROBLEM CLASSES NP, NP-HARD AND NP-COMPLETE: Definitions of P, NP Hard and NP-Complete Problems	3
	Decision Problems	
	Cook's Theorem	3
	Proving NP Complete Problems - Satisfiability problem and Vertex Cover Problem	
	Approximation Algorithms for Vertex Cover and Set Cover Problem	2

Recommended books:	
1. Rivest & Coremen, Introduction to Algorithms, II Edition, Prentice Hall of India	
2. Sartaj Sahni and Ellis Horowitz, Fundamentals of Computer Algorithms, Edition 2006, Galgotia Publications	