Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Internal	Final Exam	Total
MCA-204	Design & Analysis of Algorithms	PCC	4	4	0	0	40	60	100

Course Outcomes

	At the end of the course the student will be able to
CO1	Understand written algorithms in terms of their composite steps and transformations
CO2	Understand the design and analysis of various algorithms.
CO3	Apply important algorithmic design paradigms.
CO4	Analyze and compare the algorithms on the basis of asymptotic complexity.
CO5	Gain understanding of applicability of algorithms in devising optimal solutions to given problems in diverse domains.

Detailed Syllabus
Section-A

UNIT–I: Review of Algorithms and Data Structures: Introduction to algorithm analysis: Introduction to algorithms, Algorithm Specifications, performance analysis. Recursion and Induction: recursive procedures, recurrence relations, induction proofs, proving correctness. Randomized Algorithms: Basic of Probability Theory, Description of Randomized algorithms, Identifying the repeated Elements, Partiality Testing, Advantages and Disadvantages of using randomized algorithms.

(10Hrs)

UNIT–2: Basics of Analysis: Asymptotic Bounds, Concept of Efficiency of an Algorithm, Well Known Asymptotic Functions & Notations, Well Known Sorting Algorithms, Comparison of Sorting Algorithms, Best-Case and Worst-Case Analyses, Average-Case Analysis, Amortized Analysis

(10Hrs)

UNIT–3: Design Techniques-I:Divide-and-Conquer, General Method, Multiplication of two n-bit numbers, Binary Search, Merge Sort, Quick Sort, Stassen's Matrix multiplication, Exponentiation, Dynamic Programming, General Method, The Problem of Making Change, The Principle of Optimality, Chained Matrix Multiplication.

(10Hrs)

Section B

UNIT–4: Design Techniques-II : Backtracking, General method, n-queen's problem, Sum of subsets problem, Greedy Algorithms, General Method, Knapsack problem, Job sequencing with deadlines, Minimum Spanning Trees, Kruskal's Algorithm, Prim's Algorithm, Dijkstra's Single Source Shortest Path Algorithm

(10Hrs)

UNIT–5: Classification of Problems & Graphs Algorithms: Non-Deterministic Algorithms, Complexity classes, Introduction to NP-Completeness, Establishing NP-Completeness of Problems, NP-Completeness Proofs, NP-Hard Problems, Graphs Algorithms: Traversing Trees, Depth-First Search, Breadth-First Search, Best-First Search & Topological Sort.

(**10Hrs**)

Textbooks

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Introduction to Algorithms	T.Cormen, C. Lieserson, R.Rivest, C.Stein	Prentice-Hall/India	3rd (2009)
2	Algorithms	S. Dasgupta, C. Papadimitriou, Umesh Vazirani	McGraw Hill Education	1st (2017)

Reference Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Fundamentals of Computer Algorithms	Ellis Horowitz, Sartaj Sahni	Universities Press	2nd (2008)
2	Algorithms Design: Foundations, Analysis, and Internet Examples	Michael T. Goodrich, Roberto Tamassia	Wiley	1st (2006)