III YEAR SEM-IB.Tech CSE	ELECTIVE	L	T	P	C
Code: CS3508	Advanced Algorithms	2	2	0	4

UNIT I (Design Paradigms: Overview)
Overview of Divide and Conquer, Greedy and Dynamic Programming strategies.Basic search and traversal techniques for graphs, Backtracking, Branch and Bound.Introduction to string-matching problem, Naïve algorithm, Rabin Karp, Knuth Morris Pratt, BoyerMoore algorithms and complexity analysis, Complexity (Lower bounds, NC Class and PCompleteness).

UNIT II (Parallel Models)
Parallel Models: SIMD, MIMD, PRAMs, Interconnection Networks. Performance Measures (Time, Processors, Space, Work).Interconnection Architectures (Linear Array, Meshes, Trees, Mesh of Trees, Hyper cubes, Butterfly Networks, Cube Connected Cycles, Benes Networks).

UNIT III (Algorithms on trees and Graphs)
Balanced Trees, Pointer Jumping, Divide and Conquer, Partitioning, Pipelining, Systolic Computation.Graph Algorithms (Connected Components, Spanning Trees, Shortest Paths),

UNIT IV (Parallel Algorithms)
Accelerated Cascading, Prefix Computation, List Ranking, Euler Tour, Tree Contraction. Sorting, Searching, Merging; Matrix Operations

UNIT V(Approximation Algorithms)
Introduction, Combinatorial Optimization, approximation factor, PTAS, FPTAS, Approximation algorithms for vertex cover, set cover, TSP, knapsack, bin packing, subset-sum problem etc. Analysis of the expected time complexity of the algorithms.

UNIT VI (Randomized Algorithms)
Numerical probabilistic algorithms, Las Vegas and Monte Carlo algorithms, Game-theoretic techniques, Applications on graph problems

Text Books:

1) Introduction to Algorithms : T.H. Cormen, C.E.Leiserson and R.L. Rivest
2) Joseph Jaja,."An Introduction to Parallel Algorithms", Addison Wesley, 1992.
3) Randomized Algorithms: R. Motwani and P.Raghavan
4) Approximation Algorithms: Vijay V.Vazirani

Reference books:

1) H. Sparkias and A. Gibbon.Lecture notes on "Parallel Computation", Cambridge University Press, 1993.
2) K. Hwang and F. A. Briggs."Computer Architecture and Parallel Processing", McGraw Hill Inc., 1985.
3) Web course by IIT Madras. http://nptel.ac.in/courses/106106112/
4) Algorithmics :The spirit of computing: D.Harel

Video Reference:

Title	Expert Name	Affiliation	Weblink
Computer Algorithms -2	Prof. Dr. Shashank K. Mehta	IIT Kanpur	http://nptel.ac.in/courses/106104019/
Parallel Algorithms	Prof. Phalguni Gupta	IIT Kanpur	http://nptel.ac.in/courses/106104120/