

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Semester: 1 Computer Engineering

Subject Name Parallel Computing

Sr.No	Course content
1.	Introduction: Introduction to parallel processing, pipelining, data parallelism, control parallelism, scalability, topologies in processor organization, UMA and NUMA multiprocessors, flynn's taxonomy, Amdhle's law, basic issues in parallel programming.
2.	Abstract model of serial and parallel computation, basic PRAM algorithm: parallel reduction, prefix sums, list ranking, preorder traversal, merging, graph coloring: introduction of some parallel programming language.
3.	Mapping data to processors on processor arrays and Multi-computer dynamic load balancing on Multi-computers, Deterministic and Non-Deterministic model of scheduling on UMA and NUMA multiprocessors.
4.	Elementary parallel algorithms (on SIMD & MIMD models): Reduction algorithms, Broadcast algorithms and prefix sum algorithms.
5.	Parallel algorithms for basic arithmetic problems: Parallel addition, parallel multiplication, parallel division, FPT using modulo arithmetic and complex arithmetic.
6.	Parallel algorithms for general arithmetic expression evaluation: Nested parenthesis and polynomial evaluation.
7.	Parallel algorithms for matrix problems: Matrix addition, multiplication, solving linear equations and non-linear equations, solving linear recurrence.
8.	Parallel searching and sorting algorithms: Odd-Even Transposition, Bitonic merge sort, Quick sort on SIMD and MIMD models. Searching algorithms for SIMD and MIMD model.
9.	Parallel graph algorithms: Parallel graph traversal algorithm, All pair shortest path and minimum spanning tree algorithm.
10.	Combinatorial algorithms: Algorithms for generating permutations and combinations in parallel, parallel branch and bound algorithm and alpha-beta search algorithm.

Reference Books:

1. Michael J Quinn, Parallel Computing: Theory and Practice, MGH.
2. Selim G. AKL, The Design and Analysis of Parallel Algorithm, PHI.
3. Lakshmivardhan and Dhall, Analysis and Design of Parallel Algorithms : Arithmetic and Matrix problems.
4. Ananth Gramma et. Al., Introduction of Parallel Computing, PEARSON, Edu.
5. Barry Wilkinson; M. Allen, Parallel Computing, PEARSON, Edu. W.P.,Petersen and P.Arbenz ,Introduction to Paralled Computing , Oxford