



Kadi Sarva Vishwavidyalaya
Faculty of Engineering & Technology
Fourth Year Bachelor of Engineering (Computer)
(To be Proposed For: Academic Year 2020-21)

Subject Code: CE803E-N	Subject Title: Parallel and Distributed Algorithms
Pre-requisite	C/C++/Java etc.

Teaching Scheme (Credits and Hours)

Teaching scheme				Total Credit	Evaluation Scheme					Total Marks
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract.	
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
04	00	02	06	05	03	70	30	20	30	150

Course Objective:

- To learn parallel and distributed algorithms development techniques for shared memory and message passing models.
- To study the main classes of parallel algorithms.
- To study the complexity and correctness models for parallel algorithms.

Outline of the Course:

Sr. No	Title of the Unit	Minimum Hours
1	Introduction to Parallelism	6
2	Parallel Algorithms	8
3	Parallel Algorithm Complexity	8
4	PRAM and Basic Algorithms	9
5	Shared-Memory Algorithms	9
6	Sorting and Selection Networks	7
7	Mesh-Base Architectures	7
8	Distributed Algorithms	10

Total hours (Theory): 64

Total hours (Lab): 32

Total hours: 96



Kadi Sarva Vishwavidyalaya
Faculty of Engineering & Technology
Fourth Year Bachelor of Engineering (Computer)
(To be Proposed For: Academic Year 2020-21)

Detailed Syllabus

Sr. No	Topic	Lecture Hours	Weight age(%)
1	Introduction to Parallelism Parallel Processing Ups and Downs, Types of Parallelism: A Taxonomy	6	9
2	Parallel Algorithms Simple Computations and Architectures , Algorithms for a Linear Array , Algorithms for a Binary Tree , Algorithms for a 2D Mesh ,Algorithms with Shared Variables .	8	13
3	Parallel Algorithm Complexity Asymptotic Complexity, Algorithm Optimality and Efficiency , Complexity Classes , Parallelizable Tasks and the NC Class , Parallel Programming Paradigms , Solving Recurrences .	8	13
4	PRAM and Basic Algorithms PRAM Submodels and Assumptions , Data Broadcasting , Semigroup or Fan-In Computation , Parallel Prefix Computation , Ranking the Elements of a Linked List , Matrix Multiplication .	9	14
5	Shared-Memory Algorithms Sequential Rank-Based Selection , A Parallel Selection Algorithm , A Selection-Based Sorting Algorithm , Alternative Sorting Algorithms , Convex Hull of a 2D Point Set, Bitonic sort algorithm.	9	14
6	Sorting and Selection Networks What Is a Sorting Network, Figures of Merit for Sorting Networks , Design of Sorting Networks , Batcher Sorting Networks , Other Classes of Sorting Networks ,Selection Networks .	7	11
7	Mesh-Base . Architectures Recursive Sorting Algorithms, Greedy Routing Algorithms, Graph Algorithms , Image-Processing Algorithms.	7	11
8	Distributed Algorithms Models and complexity measures, Safety, liveness, termination, logical time and event ordering, Global state and snapshot algorithms, Mutual exclusion and Clock Synchronization, Distributed Graph algorithms.	10	15
	Total	64	100



Kadi Sarva Vishwavidyalaya
Faculty of Engineering & Technology
Fourth Year Bachelor of Engineering (Computer)
(To be Proposed For: Academic Year 2020-21)

Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lecture and laboratory which carries 10 marks in overall evaluation.
- One internal exam will be conducted as a part of internal theory evaluation.
- Assignments based on the course content will be given to the students for each unit and will be evaluated at regular interval evaluation.
- Surprise tests/Quizzes/Seminar/tutorial will be conducted having a share of five marks in the overall internal evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

Learning Outcome:

After learning the course the students should be able to

- Understand Parallel Algorithms
- Understand Parallel Algorithm Complexity
- Understand PRAM and Basic Algorithms
- Understand Shared-Memory Algorithms
- Designing Sorting and Selection Networks
- Understand and designing Mesh-Base . Architectures
- Understand Distributed Algorithms

Text books:

1. Introduction to Parallel Processing Algorithms and Architectures, Behrooz Parhami, Platinum series of computer science
2. Vijay K. Garg, "Elements of Distributed computing", Wiley Joseph F Jájá, An Introduction to Parallel Algorithms, Addison-Wesley, 1992.
3. Michael J Quinn, Parallel Programming in C with MPI and OpenMP, first edition, McGraw Hill, 2004/2003.

Reference books:

1. Michael J Quinn, Parallel Computing: Theory and Practice, second edition, McGraw Hill, 1994/2002.
2. Ananth Grama, Anshul Gupta, George Karypis and Vipin Kumar, Introduction to Parallel Computing, second edition, Addison-Wesley/Pearson, 1994/2003.
3. Nancy Lynch, Distributed Algorithms, Morgan Kaufmann.
4. Andrew S. Tanenbaum, Distributed Operating Systems, ACM Press.

List of Open Source Software/learning website:

- JAVA,C,C++
- NPTEL



Kadi Sarva Vishwavidyalaya
Faculty of Engineering & Technology
Fourth Year Bachelor of Engineering (Computer)
(To be Proposed For: Academic Year 2020-21)

List of experiments:

No	Name of Experiment
1	Implement Linear Array and Binary Tree algorithm.
2	Implement 2D Mesh and Shared Variables algorithm.
3	Implement the problem for Solving Recurrences.
4	Implement parallel Matrix Multiplication algorithm.
5	Implement Selection-Based Sorting algorithm.
6	Implement Batchier Sorting Networks.
7	Implement Bitonic sort algorithm.
8	Implement Greedy Routing algorithm.
9	Implement Distributed Graph algorithm.
10	Implement Image-Processing algorithm.
11	Implement Mutual exclusion and Clock Synchronization.