INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPT./ CENTRE**:** **Electronics and Computer Engineering**

1. Subject Code**: EC – 652N** Course Title**: Parallel and Distributed Algorithms**

2. Contact Hours: **L: 3** **T: 0** **P: 0**

3. Examination Duration (Hrs.): **Theory** 0 | 3 **Practical** 0 | 0

4. Relative Weight**:** **CWS** 15 **PRS** 00 **MTE** 35 **ETE** 50 **PRE** 00

5. Credits**:** 0 | 3 6. Semester [ ] **Autumn** [√] **Spring** [ ] **Both**

7. Pre-requisite**: EC - 351**

8. Subject Area**: DEC**

9. Objective: To provide an in-depth understanding of the fundamentals of parallel and distributed algorithms.

10. Details of the Course:

Sl. No.	Contents	Contact Hours
1.	Introduction to data and control parallelism.	2
2.	PRAM model and its variants, EREW, ERCW, CRCW, PRAM algorithms, cost optimality criterion, Brent's theorem and its importance.	8
3.	Processor organizations such as mesh and hypercube, embedding of problem graphs into processor graphs.	4
4.	Parallel algorithms for matrix multiplication, merging and sorting for different processor organizations such as mesh and hypercube.	8
5.	Introduction to distributed systems, synchronous / asynchronous network models, leader election problem in ring and general networks; Type of faults, fail safe systems, Byzantine faults, distributed consensus with link and process failures.	8
6.	Algorithms for BFS, DFS, shortest paths and spanning trees in distributed systems.	6
7.	Asynchronous networks: Broadcast and multicast, logical time, global snapshot and stable properties; Network resource allocation.	6
	Total	**42**

11. Suggested Books:

Sl. No.	Name of Books / Authors	Year of Publication
1.	Quinn, M. J., "Parallel Computing Theory & Practice", McGraw-Hill	1994
2.	Horowitz, E., Sahni, S. and Rajasekaran, S., "Computer Algorithms: C++", Galgotia Publications	2002
3.	Lynch, N. A., "Distributed Algorithms", Morgan Kaufmann.	2003
4.	Miller, R. and Boxer, L., "Algorithms Sequential & Parallel: A Unified Approach" , 2nd Ed., Charles River Media.	2005