PARALLEL & DISTRIBUTED SYSTEM

Paper Code	**CEN-606**
Course Credits	**4**
Lectures / week	**3**
Tutorial / week	**1**
Course Description	**UNIT – I**

UNIT – I

Basic Concepts: Introduction to parallel processing, parallel processing terminology, decomposition, complexity, throughout, speedup, measures, data dependence, resource dependence, Bernstein's conditions levels of parallelism in programs. Program flow-control flow, data flow, Distributed systems – Introduction, advantages, and tightly-coupled loosely-coupled systems. Hardware and software requirements, design issues.

UNIT- II

Parallel Processing – Structure & Organization: Taxonomy of parallel processes: granularity, basic architectures, multiprocessors, vector processors, pipeline:-both linear as well as non liner pipeline ,optimal design, Arithematic pipeline, Instruction pipeline, Pipeline hazards and their solution ,reservation table, scheduling;,

UNIT- III

Systolic, wavefront array, cube architecture, hypercube, CCC, pyramid, prism, network architecture – binarytree, hypertree butterfly, shuffle exchange, dataflow architecture, connection machine.System attributes to computers, clock rate, CPI,MIPS rate,throughput rates,UMa, NUMA,COMA modelsPerformance Laws:-Amdahl,Gustafson, Sun and Ni laws

UNIT- IV

Parallel Algorithms: PRAM model of computation, Elementary parallel algorithms – Broadcast, prefix sums, permutation, parallel selection, merging, sorting, Odd-even, bitonic merge, dictionary operations, elliss, Algorithm Graph Algorithms, Matrix-

transportation, multiplication,

SIMD algorithm for matrix multiplication ,solving linear systems.

UNIT – V

Parallel & Distributed Programming: Parallel Programming environments, models, synchronous asynchronous programming, modulla-2, occamm, FORTRAN, DAP FORTRAN, C-linda, Actus, data flow programming, VAL etc,. MPI, Open MP

References / Text Books:	• Michael J. Quinn, "Parallel Computing – Theory and Practice, 2nd Edition, McGraw Hill, 1994 • Kai Hwang, "Advanced Computer Architecture – Parallelism, Scalability, Programmability", McGraw Hill Inc, 1993. • Wilkinson, "Parallel Programming using networked computer" , Pearson Education India, 20006 • S. G. Akl, "The Design and Analysis of parallel algorithms", Englewood Cliffs, NJ, 1989 • S. Tanenbaum, "Modern Operating System", PHI, 1996. • R. H. Perrott, "Parallel Programming", Addison Wesley, 1987.
Computer Usage / Software Requires:	• T. G. Lewie and H. Ele-Revini, "Introduction to Parallel computing", PHI, NJ, 1992. • S. Lakshmivardhan and S.K. Dhall, "Analysis and design of parallel algorithm – arithmetic and matrix problems", McGraw Hill, 1990 • J. M. Crichlow, "An introduction to distributed and parallel computing", PHI, 1988