UNIT I    INTRODUCTION TO MULTIPROCESSORS AND 
SCALABILITY ISSUES

Scalable design principles – Principles of processor design – Instruction Level 
Parallelism, Thread level parallelism. Parallel computer models – Symmetric and 
distributed shared memory architectures – Performance Issues – Multi-core 
Architectures - Software and hardware multithreading – SMT and CMP architectures – 
Design issues – Case studies – Intel Multi-core architecture – SUN CMP architecture.

UNIT II    PARALLEL PROGRAMMING

Fundamental concepts – Designing for threads – scheduling - Threading and parallel 
programming constructs – Synchronization – Critical sections – Deadlock. Threading 
APIs.

UNIT III    OPENMP PROGRAMMING

OpenMP – Threading a loop – Thread overheads – Performance issues – Library 
functions. Solutions to parallel programming problems – Data races, deadlocks and 
livelocks – Non-blocking algorithms – Memory and cache related issues.

UNIT IV    MPI PROGRAMMING

MPI Model – collective communication – data decomposition – communicators and 
topologies – point-to-point communication – MPI Library.

UNIT V    MULTITHREADED APPLICATION DEVELOPMENT

Algorithms, program development and performance tuning.

TEXT BOOKS:

1. Shameem Akhter and Jason Roberts, “Multi-core Programming”, Intel Press, 
   2006.
2. Michael J Quinn, Parallel programming in C with MPI and OpenMP, Tata Mc 

REFERENCES:

1. John L. Hennessey and David A. Patterson, “ Computer architecture – A 
   quantitative approach”, Morgan Kaufmann/Elsevier Publishers, 4th. edition, 
   2007.
2. David E. Culler, Jaswinder Pal Singh, “Parallel computing architecture : A 