IT9156 MULTI-CORE PROGRAMMING

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UNIT I INTRODUCTION TO MULTIPROCESSORS AND SCALABILITY ISSUES 9

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 – IBM cell processor.

UNIT II PARALLEL PROGRAMMING 9

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

UNIT III Openmp Programming 9

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 9

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

UNIT V MULTITHREADED APPLICATION DEVELOPMENT: 9

Algorithms, program development and performance tuning.

TOTAL : 45 HOURS

REFERENCES

1. Michael J Quinn, “Parallel programming in C with MPI and OpenMP”, Tata McGraw Hill, 2003.
2. Shameem Akhter and Jason Roberts, “Multi-core Programming”, Intel Press, 2006.
3. John L. Hennessey and David A. Patterson, “ Computer architecture – A quantitative approach”, Morgan Kaufmann/Elsevier Publishers, 4th. edition, 2007.
4. David E. Culler, Jaswinder Pal Singh, “Parallel computing architecture : A hardware/ software approach” , Morgan Kaufmann/Elsevier Publishers, 2004.
5. Wesley Petersen and Peter Arbenz, “Introduction to Parallel Computing”, Oxford University Press, 2004.