

ADVANCED COMPUTER ARCHITECTURE

Course Code: CS8T01

Credit: 4-0-0-0-4

UNIT I: Fundamentals of Computer Design.

10Hrs

Introduction; Classes computers; Defining computer architecture; Trends in Technology; Trends in power in Integrated Circuits; Trends in cost; Dependability, Measuring, reporting and summarizing Performance; Quantitative Principles of computer design; Performance and Price-Performance

UNIT II: Parallel Program and network properties

12 Hrs

Conditions for parallelism ,data & resource dependencies, Hardware & software parallelism, The role of compilers, Program partitioning and scheduling, grain size & latency, Grain packaging and scheduling, Problems on grain packaging, Program flow mechanisms, control flow & dataflow, demand driven mechanisms, Comparison of flow mechanisms, network properties and routing, Static connection networks, dynamic connection networks

UNIT III: System interconnect architectures

10 Hrs

Network properties and routing, Data routing functions, Network performance, Static connection networks- types linear array . Ring and Chordial ring , Barrel shifter, Tree and Fat tree , Mesh and Torus , Systolic arrays, Hyper cubes, Cube connected cycles, Network throughput , Dynamic connection networks-digital buses, switch modules, Omega network, Baseline recursive network

UNIT IV: Linear Pipeline

10Hrs

Linear pipeline processors synchronous & asynchronous Processors, Cocking & timing control, speedup ,efficiency,throughput, Reservation & latency analysis, Collision free scheduling, Instruction execution phases, mechanisms for IP, Dynamic instruction scheduling, Computer stages, arithmetic principles, fixed point and floating point numbers, static arithmetic pipeline And multiply pipeline Design (up to Wallace tree)

UNIT V: Introduction to Multi-Core Architecture

10hrs

Motivation for Concurrency in Software .Parallel Computing Platforms, Parallel Computing in Microprocessors. Differentiating Multi-Core Architectures from Hyper-Threading Technology, Multi-threading on Single-Core versus Multi-Core Platforms Understanding Performance Growing Returns: Gustafson's Law.

Text Books:

1. Hennessey and Patterson: "Computer Architecture A Quantitative Approach", 4th Edition, Elsevier, 2007.
2. Kai Hwang: "Advanced Computer Architecture Parallelism, Scalability, Programmability", Second Edition Tata McGraw-Hill, 2010.
3. Shameem Akhter and Jason Roberts "Multi core programming increasing performance through software multithreading", Intel press (Digital Book)

Reference books:

1. John P Hayes; computer architecture&organization 1998.
2. V rajaramanna , c s r murthy;; parallel computers ,phi 2000.
3. David culler, J.P.singh, Anoopgupta ; “Parallel computer architecture”, Morgan Kauffman, 1999.

Course Outcomes:

1. Ability to understand the fundamental parameters for the design of computers used in parallel processing
2. Able to understand parallelism , network properties and its architecture for parallel processors
3. Ability to design and analyze linear pipeline and arithmetic pipeline.
4. Able to understand the concepts of multi-threading and multi core architectures