COMPUTER ARCHITECTURE

Paper Code	**CEN-501**
Course Credits	**4**
Lectures / week	**3**
Tutorial / week	**1**
Course Description	**UNIT – I**

Introduction to computer architecture; Moor's law; Evolution of computer architectures and current trends; classifications of computer architecture; concepts of lookahead, Pipelining, parallelism, Implicit and explicit vectors; system attributes and performance; multi-computers and multi-processors; NUMA, UMA and COMA models; supercomputers-vector supercomputer and SIMD.

UNIT- II

Advanced processor technology: Design Space of Processors, Inter-processes communication (asynchronous and synchronous), Instruction Set Architectures, CISC and RISC scalar processors, differences between CISC and RISC; Super-scalar and vector Processors: super-scalar processor; Memory Hierarchy technology: hierarchical memory technology. Inclusion, coherence and locality; visual memory models, TLB, paging and segmentation.

UNIT- III

Design of Arithematic circuit, Logical circuits, ALU, N-bit Parallel Adder, Comparison of Various parallel adders, Array Multiplication, sequential multiplier, signed multiplication, unsigned multiplication, designing fast and efficient algorithm for multiplication and Division, integer representation, floating point representation. Range of representation, Floating point operation, Register Transfer and Microoperation: Register transfer language, register transfer, bus and memory transfer, arithmetic microoperations, logic microoperations, shift microoperations, using RTL to specify digital system.

UNIT- IV

Basic concepts and its application to implement hardware loops,

Hard wired circuit to compute factorial, sum of series. Design and implementation of a very simple CPU, a relatively simple CPU Specification, fetching, decoding, executing, establishing required data paths, design of ALU, Designing control unit using hardwired control, design verification; real world example, short comings of simple CPUs

UNIT – V

Introduction, tasks of super-scalar processing, parallel decoding, super-scalar instruction issues and policies, shelving, scope of shelving, shelving buffer, operand fetch policies, renaming, preserving the sequential consistency of instructions execution, sequential consistency model, reorder buffer, super-scalar CISC and RISC

References / Text Books:

- Kai Hwang, "Advanced Computer architectures, Parallelism, Scalability & Programmability", McGraw Hill,
- Sima, Fountain & Kacsuk, "Advanced Computer architectures a design space approach", Pearson education
- John L. Hennessy & David A. Patterson, "Computer Architecture, A Quantitative Approach",Morgan Kaufmann, 3rd edition,2003.
- Rafiquzamman and Chandra, "Modern Computer Architecture". Galgotia Publication.
- J. P. Hayes, "Computer Architecture and Organization", McGraw Hill, 1998.
- W. Stallings, "Computer Organization & Architecture", PHI, 2001.