MCPE2009 ADVANCED COMPUTER ARCHITECTURE (3-0-0)

Course Objectives:
This course examines the techniques and underlying principles that are used to design high-performance computers and processors. Particular emphasis is placed on understanding the trade-offs involved when making design decisions at the architectural level. A range of processor architectures are explored and contrasted. In each case we examine their merits and limitations and how ultimately the ability to scale performance is restricted.

Module-I
Principles of Processor Performance, RISC and CISC Architectures, Pipelining fundamentals, PipelineHazards, Superscalar Architecture, Super Pipelined Architecture,VLIW Architecture.

Module-II
Basic Multiprocessor Architecture: Flynn's Classification, UMA, NUMA, Distributed MemoryArchitecture, Array Processor, Vector Processors, Associative Processor, Systolic architecture.Interconnection Networks: Static Networks, Network Topologies, Dynamic Networks.

Module-III
Hierarchical Memory Technology: Data and Instruction caches, Multi-level caches, Cache memorymapping policies, Cache Coherence, Cache Performance, Virtual memory, Page replacement techniques,Memory Inter leaving, Memory Management hardware.

Module-IV
Data Flow Computer Architecture: Static Data flow computer, Dynamic Data flow computer, Clustercomputers, Distributed computing, Cloud computing.

Course Outcomes (CO):
After successful completion of the course the student will be able to:
CO1: Understand background of processor performance and different processor architectures.
CO2: Understand the multiprocessor system taxonomy.
CO3: Understand the cache performance and memory hierarchy.
CO4: Understand the advanced computer architecture systems.

Books:

1. K. Hwang and F. A. Briggs, Computer Architecture and Parallel Processing, McGraw Hill.
2. David A. Patterson and John L. Hennessy, Computer Organization and Design, Elsevier.
3. John L. Hennessy and David A. Patterson, Computer Architecture: A Quantitative Approach,Morgan Kaufmann
4. Kai Hwang, Advanced Computer Architecture: Parallelism, Scalability, Programmability, McGraw-Hill.
5. Computer Architecture: Parhami, Oxford University Press