**Elective I: Advanced Computer Architecture syllabus**

**Unit I**: Fundamentals of Computer Design: Defining computer architecture,

trends in technology, trends in power in integrated circuits, trends in cost,

dependability, and measuring, reporting and summarizing performance.

**Unit II**: Instruction-Level Parallelism: Concepts and challenges in ILP, basic

compiler techniques for Exposing ILP – reducing branch costs with prediction,

overcoming data hazards with dynamic scheduling, hardware-based

speculation, exploiting ILP using static and dynamic scheduling, limitations of

ILP, using ILP support to exploit thread-level parallelism.

**Unit III**: Vector architecture: SIMD instruction set, extensions for multimedia,

graphics processing units, detecting and enhancing loop-level parallelism,

centralized shared-memory architectures, performance of shared-memory,

multiprocessors, distributed shared memory, directory based coherence, basics

of synchronization, models of memory consistency.

**Unit IV**: Memory Hierarchy Design: Cache performance: Eleven advanced

cache optimizations, Protection via virtual memory and virtual machine, Impact

of virtual machines on virtual memory and I/O, memory hierarchies, design of

memory hierarchies.

**Unit V**: Introduction to Message passing Architecture: Routing in message

passing architecture, message passing programming model, processor support

for message passing, message passing versus shared memory architecture.

**Unit VI**: Storage Systems: Advanced topics in disk storage, definition and

examples of real faults and failures, i/o performance, reliability measures and

benchmarks – designing and evaluating an i/o system.

**Text Books**:

1. Computer Organization and Architecture - Designing for Performance,

William Stallings, 8th Edition, Prentice Hall, 2010.

2. Advanced Computer Architecture, Kai Hwang, 2nd Edition, Tata

McGraw-Hill, 2011.

3. Advanced Computer Architecture and Parallel Processing, Hesham ElRewini and Mostafa Abd-El-Barr, Wiley, 2005.

Reference Books:

1. Parallel Computing architecture: A hardware / software approach,

David E. Culler and Jaswinder Pal Singh, Morgan Kaufmann, 1998.

2. Computer Architecture and Organization, 3rd Edition, J. P. Hayes,