Subject Code	Subject Name	Credits
26CS617	ADVANCED COMPUTER NETWORKS	04

Course Objectives:

1. To understand advanced processor design and architecture concepts
2. To study parallel processing and multiprocessor systems
3. To analyse performance optimization techniques
4. To learn memory hierarchy and cache optimization
5. To explore modern architectures like GPUs and multi-core systems
6. To develop skills in designing high-performance computing systems

Learning Objectives:

After completion of the course the students will be able to:

1. Analyze instruction-level parallelism (ILP) techniques
2. Design and evaluate pipelined and superscalar processors
3. Understand multi-core and many-core architectures
4. Apply cache and memory optimization strategies
5. Understand parallel computing models and architectures
6. Work with modern architectures like GPUs and heterogeneous systems
7. Solve real-world performance and scalability problems

Unit I - Network Architecture & Routing (12 Hrs.)

5-layer TCP/IP model, Internet protocols & addressing (IPv6), Routing protocols (RIP, OSPF, BGP), and Multiprotocol Label Switching (MPLS), End-to-End Protocol.

Unit II - Wireless Networks (12 Hrs.)

Wireless LANs (802.11), Mobile IP, Cellular networks, and Wireless Mesh Networks, Network Management & Security: DNS, SMTP, SNMP, Network security, Cryptography, and Virtual Private Networks (VPNs), Advanced Topics: Queuing systems, Performance Modeling, and Software-Defined Networking (SDN).

Unit III - Fundamentals of Computer Architecture (12 Hrs.)

Review of basic architecture concepts, Performance metrics (CPI, IPC, speedup), Instruction set architecture (ISA) overview, Instruction-Level Parallelism (ILP)

UNIT IV - Memory Hierarchy Design (12 Hrs.)

Cache memory - introduction to memory hierarchy, Concept of cache memory, Cache organization and structure, Cache mapping techniques, Cache performance metrics - Types of cache: Multi-level cache systems- Need for multi-level caching, Levels of cache: Virtual memory, Memory consistency models, Multiprocessors and Multicore Systems

UNIT V - GPU and Heterogeneous Computing (12 Hrs.)

GPU architecture basics, CUDA/OpenCL overview, Heterogeneous systems (CPU + GPU), Applications of GPU computing, Fault tolerance

Reference Books:

1. "Computer Architecture: A Quantitative Approach" – John L. Hennessy & David A. Patterson
2. "Computer Organization and Design" – David A. Patterson & John L. Hennessy
3. "Structured Computer Organization" – Andrew S. Tanenbaum
4. "Computer Architecture and Parallel Processing" – Kai Hwang