

NIRMA UNIVERSITY
SCHOOL OF TECHNOLOGY, INSTITUTE OF TECHNOLOGY
M.Tech. in Electronics & Communication Engineering (VLSI Design)
M.Tech. Semester - II
Department Elective II

L	T	P	C
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Course Code	3EC12D202
Course Title	Advanced Processor Architecture

Course Outcomes (COs):

At the end of the course, students will be able to -

1. Comprehend architecture of modern controller and bus protocols for embedded system.
2. Apply the compiler techniques to exploit the instruction level parallelism.
3. Analyze the performance of symmetric and distributed shared memory based multiprocessors.

Syllabus:

Teaching Hours:

UNIT I: Processor Architecture Fundamentals

Classification of Processor Architectures, Instruction set principles, Memory Hierarchy Design, Measuring and Reporting performance **04**

UNIT II: Instruction Level Parallelism

12

Pipeline concept, Classification of Pipeline Processors, Instruction flow and Register data flow techniques, Compiler Techniques to exploit Instruction level parallelism

UNIT III: Multiprocessors and Thread-Level Parallelism

10

Symmetric Shared-Memory Architectures, Performance of Symmetric Shared-Memory Multiprocessors, Distributed Shared Memory and Directory-Based Coherence, Thread level parallelism

UNIT IV: ARM Microcontroller Architecture

10

Block Diagram, Features, Memory Mapping Memory Controller (MC), Memory Controller Block Diagram, Address Decoder, External Memory Areas, Internal Memory Mapping, External Bus Interface (EBI), Organization of the External Bus Interface, EBI Connections to Memory Devices, External Memory Interface, Write Access, Read Access, Wait State Management, Memory Management Units, details of the ARM MMU, ARM Instruction Set, Thumb Instruction Set and Interrupt

UNIT V: Bus Standard

05

Introduction to Serial and Parallel Bus standard, PCI, AXI

UNIT VI: Case Study

04

ARM Processors - OMAP, TI MSP-430 RISC/ARM Design Philosophy, ARM CORTEX Architecture

Self-Study:

The self-study contents will be declared at the commencement of Semester. Around 10% of the questions will be asked from self-study contents.

Suggested Readings:

1. John L. Hennessy, David A. Patterson, Computer Architecture: A Quantitative Approach, Elsevier
2. John Paul Shen and Mikko H. Lipasti, Modern Processor Design Fundamentals of Superscalar Processors, TMH
3. Behrooz Parahami, Computer Architecture from Microprocessor to Super Computer, Oxford.
4. Steve Furber, ARM System- On- Chip Architecture, Pearson Education Asia
5. Andrew N Sloss, Dominic Symes, Chris Wright, ARM System Developer's Guide - Designing and Optimizing System Software, Elsevier

L = Lecture, T = Tutorial, P = Practical, C = Credit