

NIRMA UNIVERSITY
SCHOOL OF TECHNOLOGY, INSTITUTE OF TECHNOLOGY
M. Tech. in Electronics & Communication Engineering (Embedded System)
M.Tech Semester - I

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Course Code	6EC202
Course Title	Processor Architecture and Design

Course Learning Outcomes (CLOs):

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

1. Comprehend architecture of modern processor/controller and bus protocols for embedded system.
2. Appraise the concept of the instruction and thread level parallelism,
3. Analyze the performance of symmetric and distributed shared memory based multiprocessors.

Syllabus:

Teaching Hours:45

UNIT I: Processor Architecture Fundamentals	04
Classification of Processor Architectures, Instruction set principles, Memory Hierarchy Design, Measuring and Reporting performance	
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 Standards	05
SPI, I2C, CAN, USB, PCI, PCIe.	
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 question will be asked from self study contents.

Suggested Readings:

1. John L. Hennessy, David A. Patterson, Computer Architecture: A Quantitative Approach, Stanford University, 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