SYSTEM ON CHIP ARCHITECTURE
(ELECTIVE – I)

Course Code: 15EC2206

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Pre requisites: Micro controllers, Embedded Systems

Course Outcomes: At the end of the course the student will be able to

CO1: Comprehend abstraction in Hardware, SOC of ARM Processor.

CO2: Evaluate and analyze system on chip RISC Machine, 3and5 stage Pipeline.

CO3: Develop programs on ARM Processor.

CO4: Knowledge of Memory Hierarchy ARM Interface.

CO5: Integrate the Knowledge of ARM for applications of System on Chip.

UNIT-I   (10-Lectures)
INTRODUCTION TO PROCESSOR DESIGN:

Abstraction in hardware design, MUO a simple processor, Processor design trade off, Design for low power consumption.

UNIT-II   (10-Lectures)
ARM PROCESSOR AS SYSTEM-ON-CHIP:

Acorn RISC Machine – Architecture inheritance –ARM programming model – ARM development tools – 3 and 5 stage pipeline ARM organization – ARM instruction execution and implementation – ARM Co-processor interface.

UNIT-III   (10-Lectures)
ARM ASSEMBLY LANGUAGE PROGRAMMING:

ARM instruction types – data transfer, data processing and control flow instructions – ARM instruction set – co-processor instructions.
Architectural Support for High Level Language - Data types – Abstraction in software design – Expressions – Loops – Functions and Procedures – Conditional Statements – Use of Memory.

UNIT-IV   (10-Lectures)
MEMORY HIERARCHY:
Memory size and speed –on chip memory –caches-cache design an example-Memory management
Architectural Support for System Development-Advanced Microcontroller bus architecture-ARM Memory Interface-ARM Reference Peripheral specification –Hardware System Prototyping tools – Emulator –Debug architecture.

UNIT-V   (10-Lectures)
ARCHITECTURAL SUPPORT FOR OPERATING SYSTEM:
An introduction to Operating Systems-ARM System Control coprocessor-CP15 Protection unit registers-ARM protection unit-CP15 MMU registers-ARM Architecture-Synchronization-Context Switching input and output.

TEXT BOOKS:
1. Steve Furber, "*ARM system on chip Architecture*", 2nd ed., Addison Wesley Professional, 2000.

REFERENCES:
1. Michael J Flynn, Wayne Luck, "*Computer System Design: System on Chip*", Wiley India Edition.
2. PrakashRashinkar, Peter Paterson and Leena Singh L., "*System on Chip Verification – Methodologies and Techniques*", Kluwer Academic Publisher, 2001.
3. Ricardo Reis, "*Design of System on a Chip: Devices and Components*" 1st ed., Springer, 2004.