

RISC PROCESSOR ARCHITECTURE AND PROGRAMMING

II Semester: ES

Course Code	Category	Hours / Week			Credits	Maximum Marks		
BESC22	ELECTIVE	L	T	P	C	CIA	SEE	Total
		3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes:45		

I. COURSE OVERVIEW:

This course emphasizes on comprehensive treatment of embedded hardware and real time operating systems along with case studies, in tune with the requirements of Industry. It focus on design, construct, program, verify, analyze and troubleshoot ARM assembly and C language programs and supporting hardware. This course enable exposure to ARM architecture and make the students to learn the ARM programming & Thumb programming models.

II. COURSE OBJECTIVES:

The students will try to learn:

- I. The processor architecture and organization for programming model of ARM processor.
- II. Arm-based embedded system and programming models using instruction set to satisfy given user specification.
- III. Memory management in Arm-based microcontrollers for modern embedded computing platforms.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

CO1	Outline the design philosophy of embedded systems and architecture of ARM for different ARM Processor families	Understand
CO2	Distinguish the performance of pipelining and non pipelining environment in a Risc processor	Analyze
CO3	Discuss various instruction set and addressing modes for ARM programming	Remember
CO4	Inspect aware of the Thumb mode for programming of ARM Processor	Analyze
CO5	Apply Architecture, modes of operations, Exceptions to write assembly language program of ARM Processors	Apply
CO 6	Identify various types of Processors & Peripherals required to design an RISC processor architecture	Remember

V. SYLLABUS:

MODULE – I: ARMARCHITECTURE

ARM design philosophy, registers, program status register, instruction pipeline, interrupts and vector table, architecture revision, ARM processor families.

MODULE – II: ARMPROGRAMMINGMODEL – I

Instruction set: Data processing instructions, addressing modes and branch, load, store instructions, PSR instructions and conditional instructions.

MODULE – III: ARM PROGRAMMING MODEL – II

Thumb instruction set: Register usage, other branch instructions and data processing instructions.

Single register and multi register load, store instructions, stack and software interrupt instructions.

MODULE – IV: ARM PROGRAMMING

Simple C programs using function calls, pointers, structures, integer and floating point arithmetic, assembly Code using instruction scheduling, register allocation, conditional execution and loops.

MODULE – V: MEMORYMANAGEMENT

Cache architecture, policies, flushing and caches, MMU, page tables, translation access permissions, context switch.

TEXT BOOKS:

1. Andrew N.Sloss, Dominic Symes, Chris Wright.,“ARM Systems Developer’s Guides, Designing & Optimizing System Software,” Elsevier, 1st Edition,2008.

REFERENCE BOOKS:

1. JonathanW.Valvano –Brookes/ Cole, “Embedded Microcomputer Systems, Real Time Interfacing”, Thomas Learning, 1st Edition, 1998.

WEB REFERENCES:

1. <http://nptel.ac.in/courses/106103068/34>
2. <http://nptel.ac.in/courses/106103068/35>
3. <http://nptel.ac.in/courses/106103068/>
4. <http://nptel.ac.in/courses/106108055/5>

VIII. E-TEXT BOOKS:

1. nptel.ac.in/courses/Webcourse-contents/IIT.../comp...risc/1_Intro_risc_Suroj.doc
2. nptel.ac.in/reviewed_pdfs/106102062/lec7.pdf