ADVANCED MICROPROCESSORS AND INTERFACING

II Semester: ECE(ES)								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
BESC13	Core	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	0	0	3	30	70	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes:45**		

I. COURSE OVERVIEW:
This course provides the exposure to ARM architecture, programming model and its interfacing with peripherals. It covers the ARM cortex processor, memory management, programming model and interfacing peripherals with ARM processor. Programming skills to develop the model using ARM processors.

II. COURSE OBJECTIVES:
The students will try to learn:
  I.   The architecture of ARM series microprocessors and its programming models.
  II.   The memory management in ARM processors
  III. The peripherals interfacing with ARM processors using high and low level languages.

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

CO 1	**Describe** the features of ARM processors for signal description and architecture.	Understand
CO 2	**Illustrate** the programmer's model of ARM processor and test the programming model using high level and low level languages.	Understand
CO 3	**Demonstrate** the internal architecture and various modes of operation of the devices used for interfacing memory and I/O deviceswith ARM processor.	Understand
CO 2	**Apply** the memory management architecture for allocating the MMU	Apply
CO 4	**Analyze** floating point processor architecture and its architectural support for higher level language.	Analyze
CO 6	**Build** prototype models and products subsequently in embedded field for real life needs and applications.	Apply

IV. SYLLABUS:

MODULE – I:ARM ARCHITECTURE and INSTRUCTION SET(9)
ARM Design Philosophy, Registers, PSR, Pipeline, Interrupts and Vector Table, Architecture Revision, ARM Processor Families. Instruction Set: Data Processing Instructions, Branch, Load, Store Instructions, PSR Instructions, Conditional Instructions.

MODULE – II:ARM PROGRAMMING MODEL(9)
Thumb Instruction Set: Register Usage, Other Branch Instructions, Data Processing Instructions, Single-Register and Multi Register Load-Store Instructions, Stack, Interrupts, Software Interrupt Instructions, Exception handling

MODULE – III: MEMORY MANAGEMENT(9)
Cache Architecture, Polices, Flushing and Caches, MMU

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MODULE – IV: **ARM PROGRAMMING USING HIGH LEVEL LANGUAGE(9)**

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:PERIPHERAL INTERFACING OF ARM PROCESSOR(9)

Timer – UART –interrupt structure – ADC and DAC Interfacing, keyboard Interface, LCD interface, on chip ADC/DAC interface. Implementation using Keil: Interfacing ADC for LCD display, Interfacing DAC to RELAY, Interfacing KEYPAD

V. TEXT BOOKS:

1   Andrew Sloss, Dominic systems and chris wright, "ARM System Developers guide designing and optimizing system", Elsevier India private limited, New Delhi, 2009.
2   Andrew N. Sloss, Dominic Symes, Chris Wright, "ARM Systems Developer's Guides- Designing & Optimizing System Software", 2008, Elsevier.

VI. REFERENCE BOOKS:

1   Dr. Jonathan W. Valvano, "Embedded Systems: Introduction to ARM Cortex-M Microcontrollers", 2012. (UNIT III, IV)
2   A.K.Ray& K.M Bhurchandi, 'Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing', Tata McGraw Hill, 2006.
3   Richard Stevens, "Advanced UNIX Programming", Addison-Wesley Professional, 3rd Edition, 2013.
4   Jonathan W. Valvano – Brookes / Cole, "Embedded Microcomputer Systems, Real Time Interfacing", Thomas Learning, 1999.

VII. WEB REFERENCES:

1   http://nptel.ac.in/courses/106105036/
2   https://arm.com
3   https://www.youtube.com/watch?v=hELr9-7aAG8

VIII. E-TEXT BOOKS:

1   https://jntukucen.ac.in/ebook_files/155.pdf
2   https://thebookee.net/ece-611-advanced-microprocessors-george-doc-dl2659322
3   https://www.k-space.org/Class_Info/STM32_Lec1.pdf