

Course code	Course name	L-T-P-Credits	Year of Introduction
AE308	ADVANCED MICROPROCESSORS	3-0-0-3	2016
<b>Prerequisite:</b> AE305 Microprocessors & microcontrollers			
<b>Course Objective</b>			
<ul style="list-style-type: none"> <li>To familiarise the importance and applications of advance microprocessor</li> <li>To understand architecture of ARM processor</li> <li>To understand instruction set of ARM processor</li> </ul>			
<b>Syllabus</b>			
Need of advance microprocessors- RISC and CISC- ARM Architecture and Programmers Model- ARM Instruction set- C Programming for ARM- Memory management units- Advanced Microprocessor Bus Architecture.			
<b>Expected outcome</b>			
<ul style="list-style-type: none"> <li>The students will have good idea about ARM processor and its application.</li> </ul>			
<b>Text Books</b>			
<ol style="list-style-type: none"> <li>Andrew N. Sloss, Dominic Symes, Chris Wright <i>ARM System Developer's Guide, Designing and Optimizing System Software</i>, Elsevier</li> <li>Muhammad Ali Mazidi, <i>ARM Assembly Language Programming &amp; Architecture</i>, Kindle edition</li> <li>Steve Furber <i>ARM System-on-chip Architecture</i>, 2nd Edition, , Pearson publication</li> <li>William Hohl and Christopher Hinds, <i>ARM Assembly Language, Fundamentals and Techniques</i>, 2nd edition, CRC Press.</li> </ol>			
<b>Reference Books</b>			
<ol style="list-style-type: none"> <li>Douglas V.Hall, "<i>Microprocessors and Interfacing</i>", Tata McGraw Hill, II Edition 2006</li> <li>Mohamed Rafiquzzaman, "<i>Microprocessors and Microcomputer Based System Design</i>", II Edition, CRC Press, 2007</li> </ol>			
<b>Course Plan</b>			
Module	Contents	Hours	Semester Exam Marks
I	Introduction: Need of advance microprocessors, Difference between RISC and CISC, RISC Design philosophy, ARM Design Philosophy, History of ARM microprocessor, ARM processor family, Development of ARM architecture.	7	15%
II	The ARM Architecture and Programmers Model : The Acorn RISC Machine, ARM Core data flow model, Architectural inheritance, The ARM7TDMI programmer's model: General purpose registers, CPSR, SPSR, ARM memory map, data format, load and store Architecture, Core extensions, Architecture revisions, ARM development tool.	7	15%
<b>FIRST INTERNAL EXAMINATION</b>			
III	ARM Instruction set: Data processing instructions, Arithmetic and logical instructions, Rotate and barrel shifter, Branch instructions, Load and store instructions, Software interrupt instructions, Program status register instructions,	8	15%

	Conditional execution, Multiple register load and store instructions, Stack instructions, Thumb instruction set, advantage of thumb instructions, Assembler rules and directives, Assembly language programs for shifting of data, factorial calculation, swapping register contents, moving values between integer and floating point registers		
<b>IV</b>	C Programming for ARM: Overview of C compiler and optimization, Basic C data types, C Looping structures, Register allocations, function calls, pointer aliasing, structure arrangement, bit fields, unaligned data and Endianness, Division, floating point, Inline functions and inline assembly, Portability issues. C programs for General purpose I/O, general purpose timer, PWM Modulator, UART, I2C Interface, SPI Interface, ADC, DAC.	7	15%
<b>SECOND INTERNAL EXAMINATION</b>			
<b>V</b>	Memory management units: Moving from memory protection unit (MPU) to memory management unit (MMU), Working of virtual memory, Multitasking, Memory organization in virtual memory system, Page tables, Translation look aside buffer, Caches and write Buffer, Fast context switch extension.	7	20%
<b>VI</b>	Advanced Microprocessor Bus Architecture (AMBA) Bus System, User peripherals, Exception handling in ARM, ARM optimization Techniques.	6	20%
<b>END SEMESTER EXAMINATION</b>			

### QUESTION PAPER PATTERN:

Maximum Marks:100

Exam Duration: 3 Hours

#### Part A

Answer any two out of three questions uniformly covering Modules 1 and 2 together. Each question carries 15 marks and may have not more than four sub divisions.

(15 x 2 = 30 marks)

#### Part B

Answer any two out of three questions uniformly covering Modules 3 and 4 together. Each question carries 15 marks and may have not more than four sub divisions.

(15 x 2 = 30 marks)

#### Part C

Answer any two out of three questions uniformly covering Modules 5 and 6 together. Each question carries 15 marks and may have not more than four sub divisions.

(20 x 2 = 40 marks)