

3EC10: ADVANCE MICROCONTROLLER
CREDITS - 2 (LTP: 2,0,0)

Course Objective:

To gain knowledge and skills in the field of embedded system covering various advanced Micro-controller.

Teaching and Assessment Scheme:

Teaching Scheme (Hours per Week)			Credits	Assessment Scheme				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE	CE	ESE	CE	100	
2	0	0	2	60	40	00		00

Course Content:

Unit. No.	Topics	Teaching Hr.
1.	ARM Embedded Systems and ARM Processor Fundamentals : The RISC design philosophy, ARM design philosophy, ARM core data flow model, Registers, CPSR-Processor modes, Banked registers. Pipeline-Characteristics.	05
2.	ARM Instruction Set : General Structure of ARM assembly module, Assembler directives, Fundamentals of ARM instructions, Barrel shifter, Classification and explanation of instructions with examples- Data processing, Arithmetic & logical, Branch, Load-store. Introduction to THUMB, Differences between ARM and THUMB, Register usage in Thumb. Exception handling- ARM processor exceptions and modes, vector table, exception priorities, link register offsets. Interrupts- assigning interrupts, interrupt latency, IRQ and FIQ.	06
3.	LPC2148 ARM CPU and Peripherals : LPC 2148- Salient features, applications, Pin Connect Block- Features, Register description with example. GPIO-Features with examples, PLL-Features with examples, Timers-Features with examples	07
4.	Introduction to MSP430 Architecture : Features of MSP430 suitable embedded application, Different families and naming of MSP430, MSP430 Architecture, Program Counter (PC), Stack Pointer (SP), Status Register (SR), Constant Generators, General Purpose Registers, Addressing Modes, Low-Power Modes of Operation of MSP430	06

Unit. No.	Topics	Teaching Hr.
5.	MSP430 Assembly and C Programming : MSP430 Instruction Set, Classification, Movement Instructions, Arithmetic and Logic Instructions with Two Operands, Shift and Rotate Instructions, Flow of Control instructions. Simple assembly language programs, simple Embedded C programs such as programs to control LEDs, access switches, generating delays and so on.	06
Total		30

List of References:

1. Lyla B. Das, “*Embedded Systems an Integrated Approach*”, 1st Edition, Pearson, 2013.
2. Steve Furber, “*ARM System –On –Chip architecture*”, 2nd Edition, Addison Wesley, 2000.
3. Wayne Wolf “*Computers as Components, Principles of Embedded Computing Systems Design*”, 2nd Edition, Elsevier, 2008
4. K.V. Shibu, “*Introduction to Embedded Systems*”, 1st edition, McGraw Hill Education.
5. Manuel Jiménez, Rogelio Palomera, Isidoro Couvertier “*Introduction to Embedded Systems Using Microcontrollers and the MSP430*” Springer Publications, 2014.
6. John H. Davies “*MSP430 Microcontroller Basics*”, Elsevier Ltd Publications, 2008.

Course Outcomes (COs):

1. Become familiar with importance and applications of advance microcontroller.
2. Understand architecture and instruction set of ARM processor
3. Design and Write hybrid (assembly & C) program for ARM processor.
4. Understand the architecture, instruction, addressing modes and applications of MSP430.
5. Design and Develop application programs using MSP430 with assembly and C language.