

MSP430 MICROCONTROLLER B.E., V Semester, Electronics & Communication Engineering [As per Choice Based Credit System (CBCS) Scheme]			
Course Code	17EC555	CIE Marks	40
Number of Lecture Hours/Week	03	SEE Marks	60
Total Number of Lecture Hours	40 (8 Hours / Module)	Exam Hours	03
CREDITS – 03			
Course objectives: This course will enable students to: <ul style="list-style-type: none"> • Understand the architectural features and instruction set of 16 bit microcontroller MSP430. • Program MSP430 using the various instructions for different applications. • Understand the functions of the various peripherals which are interfaced with MSP430. • Describe the power saving modes in MSP430. • Explain the low power applications using MSP430. 			
Module-1			
MSP430 Architecture: Introduction –Where does the MSP430 fit, The outside view, The inside view-Functional block diagram, Memory, Central Processing Unit, Memory Mapped Input and Output, Clock Generator, Exceptions: Interrupts and Resets, MSP430 family. (Text: Ch1- 1.3 to 1.7, Ch2- 2.1 to 2.7, Ch5- 5.1, 5.7 up to 5.7.1) L1, L2			
Module-2			
Addressing Modes & Instruction Set- Addressing Modes, Instruction set, Constant Generator and Emulated Instructions, Program Examples. (Text: Ch5- 5.2 to 5.5) L1, L2, L3			
Module-3			
Clock System, Interrupts and Operating Modes- Clock System, Interrupts, What happens when an interrupt is requested, Interrupt Service Routines, Low Power Modes of Operation, Watchdog Timer, Basic Timer1, Real Time Clock, Timer-A: Timer Block, Capture/Compare Channels, Interrupts from Timer-A. (Text: Ch5 - 5.8 upto 5.8.4, Ch 6-6.6 to 6.8, 6.10, Ch8 -8.1, 8.2, 8.3) L1, L2			
Module-4			
Analog Input-Output and PWM - Comparator-A, ADC10, ADC12, Sigma-Delta ADC, Internal Operational Amplifiers, DAC, Edge Aligned PWM, Simple PWM, Design of PWM. LCD interfacing. (Text: Ch9 – 9.1 up to 9.1.2, 9.4, 9.5 up to 9.5.1, 9.7, 9.8 up to 9.8.1, 9.11.5, 9.12 (without 9.12.1), 8.6.2 to 8.6.4) L1, L2			
Module-5			

Digital Input-Output and Serial Communication:

Parallel Ports, Lighting LEDs, Flashing LEDs, Read Input from a Switch, Toggle the LED state by pressing the push button, LCD interfacing.

Asynchronous Serial Communication, Asynchronous Communication with USCI_A, Communications, Peripherals in MSP430, Serial Peripheral Interface.

(Text: Selected topics from Ch4 & Ch7 and Ch7- 7.1, Ch10 – 10.1, 10.2, and 10.12)

L1, L2, L3

Course outcomes: After studying this course, students will be able to:

- Understand the architectural features and instruction set of 16 bit microcontroller MSP430.
- Develop programs using the various instructions of MSP430 for different applications.
- Understand the functions of the various peripherals which are interfaced with MSP430 microcontroller.
- Describe the power saving modes in MSP430.
- Explain the low power applications using MSP430 microcontroller.

Evaluation of CIE Marks:

It is suggested that at least a few simple programs to be executed by students using any evaluation board of MSP430 for better understanding of the course. This activity can be considered for the evaluation of 10 marks out of 40 CIE (Continuous Internal Evaluation) marks, reserved for the other activities.

Question paper pattern:

- The question paper will have ten questions
- Each full question consists of 16 marks.
- There will be 2 full questions (with a maximum of three sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module
- The students will have to answer 5 full questions, selecting one full question from each module

Text Book:

John H Davies, MSP430 Microcontroller Basics, Newnes Publications, Elsevier, 2008.

References:

1. Chris Nagy, Embedded Systems Design using TI MSP430 Series, Newnes Publications, Elsevier, 2003.
2. User Guide from Texas Instruments.

D.V. R.

H. O. D.

Dept. Of Electronics & Communication
Alva Institute of Engg. & Technology
Mijar, MOODBIDRI - 576 125