SCHEME OF COURSE WORK

Course Details:

Course Title	: Embedded Systems-2		
Course Code	: 13CT1129	**L T P C**	**: 4 1 0 3**
Program:	: B.Tech.		
Specialization:	: Information Technology		
Semester	: VII		
Prerequisites	: Embedded Systems-1		
Courses to which it is a prerequisite	**:**		

Course Outcomes (COs):

At the end of the course the student will be able to
1. Understand the essentials of the ARM7 instruction set and its registers and able to write programs in assembly language for real time problems.
2. Understand the essentials of the PIC32 instruction set and its registers and able to write programs in assembly language for real time problems.
3. Design their application by interfacing System Peripherals and external sensors.
4. Understand Modern communication protocols starting with addressable USART, SPI bus, 12C bus and USB; their characteristics protocols and usage in high speed communication.
5. Know the basics of In Circuit Emulation techniques using JTAG.

Course Outcome Versus **Program Outcomes:**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	M	S	M									
CO-2	S	S	M									
CO-3		S	S	S		M						
CO-4	M	S	M	S								M
CO-5		S	M	M	M							M

S - Strongly correlated, *M - Moderately* correlated, *Blank - No correlation*

Assessment Methods: Assignment / Quiz / Seminar / Case Study / Mid-Test / End Exam

Teaching-Learning and Evaluation

Week	Topic/Content	Course outcomes	Sample questions	Teaching learning Strategy	Assessment Methods
1	ARM / THUMB architecture, ARM / THUMB register	CO1	1. List the different modes of ARM processor. 2. How I/O pins are	1.lecture	1.assignment-1 2.quiz-1

			managed in GPIO programming?		3.mid-1
2	The bus structure and the peripherals, memory organization,Addressing modes	CO1	1. what are the different types of addressing modes in ARM 2.Explain the memory org nization in ARM	1.lecture	1.assignment-1 2.quiz-1 3.mid-1
3	Load and store instruction set, Assembly language programming (64 bit addition ,string operations)	CO1	1. What are the different usages of LOAD instruction? 2. Draw the program status register format of ARM processor?	1.lecture	1.assignment-1 2.quiz-1 3.mid-1
4	ARM interfacing programs: GPIO, Timers, Counters,	CO1	1. Explain the timers and counters in ARM 2. How do you measure time of execution of an assembly language program?	1.lecture.	1.assignment-1 2.quiz-1 3.mid-1
5	PWM, ADC. Application coding examples: Measurement and control of time, frequency	CO1	1. With a neat diagram explain the working of PWM. 2. What is an Analog to Digital Converter?	1.lecture	1.assignment-1 2.quiz-1 3.mid-1
6	Velocity and acceleration, power control and touch monitoring.	CO1	1. Write an assembly language program to measure velocity of an object given distance, initial velocity and	1.lecture	1.assignment-1 2.quiz-1 3.mid-1

			acceleration. 2. Write a program to find measure time given the clock frequency.		
7	Introduction to MIPS processor architecture in PIC 32 bit family, CPU architecture and a detailed introduction to peripherals,	CO2	1. Draw the architecture of PIC32 Microcontroller. 2. Mentions the peripheral devices in PIC 32	1.lecture	1.assignment-1 2.quiz-1 3.mid-1
8	GPIO, timers	CO2,CO3	1. Explain the timers and counters in PIC 32 2. How do you measure time of execution of an assembly language program?	1.lecture 2. ALP programms write up practices.	1.assignment-1 2.quiz-1 3.mid-1
9	capture control and PWM features. Instruction set usage with application examples.	CO3	1. With a neat diagram explain the working of PWM. 2. What is capuure? Where it is used?	1.lecture	1.assignment-1 2.quiz-1 3.mid-1
10	PIC 32 Interrupts, modes and vectored interrupt priority processing using the many shadow registers	CO2,C03	1. How interrupts are prioritized in PIC 32 processor? 2. Why do we require shadow registers?	1.lecture	1.assignment-2 2.quiz-2 3.mid-2

11	Interfacing programs using interrupts. Measurement of time, frequency.	CO3	1. Write an ALP for to measure time. 2.What is an interrupt latency?	1.lecture	1.assignment-2 2.quiz-2 3.mid-2
12	Interfacing programs measurement of velocity & acceleration.	C04	1.Write an ALP for to measure acceleration	1.lecture	1.assignment-2 2.quiz-2 3.mid-2
13	Modern communication protocols starting with addressable USART, SPI bus.	CO4	1. What is synchronous communication? 2. Write any two differences between USART and SPI Bus.	1.lecture	1.assignment-2 2.quiz-2 3.mid-2
14	12C bus and USB; their characteristics protocols and usage in high speed communication.	CO4	1. List any two characteristics of USB. 2. Explain the concept of Multiple bus Masters and Multiple slaves. 3. Differentiate between serial communication and parallel communication.	1.lecture	1.assignment-2 2.quiz-2 3.mid-2
15	Introduction to In Circuit Emulation techniques using JTAG.	CO5	1. Expand the term JTAG? What is its importance? 2. Why do we require In-circuit flash programming? 3. What is the difference between simulation and emulation?	1.lecture	1.assignment-2 2.quiz-2 3.mid-2

16	Mid-II	
17	END EXAM	