EMBEDDED SYSTEMS LABORATORY

II Semester: ES

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
BESB19	**Core**	-	-	3	2	30	70	100

Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36	Total Classes: 36

i. COURSE OVERVIEW:

This course outlines the design and implementation of embedded systems using suitable hardware (ARMand PSOC) and Keil Embedded C software tools. The instruction set, Embedded C programming for I/O and memory interfacing techniques are covered. The hands-on experience acquired by the student's during the course makes them to carry out processor/controller based projects and extend their knowledge on the latest trends and technologies in the field of embedded system.

II.COURSE OBJECTIVES:

The students will try to learn:
  I.   The embedded C for reading data from port pins.
  II. The interfacing of data I/O devices with microcontroller.
  III. The serial communication, port RTOS on microcontroller.

III.COURSE OUTCOMES:

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

CO1	Make use of emulators and cross-compilers for writing, compiling and running an embedded C language programs on ARM and PSoC training boards.	Apply
CO2	Develop Embedded C language programs for accomplishing code to reading the data from ports, blinking the LED and interfacing of switch and buzzer , temperature sensors and other display units to the ARM processors	Apply
CO3	Select suitable RTOS of ARM and PSoC and write Embedded C language program to run 2 to 3 tasks simultaneously.	Apply
CO4	Identify different filters and timers in PSoC for transmitting the data between PSOC and peripherals	Apply
CO5	Utilize Analog to Digital and Digital to Analog converters with PSoC for data conversion	Apply
CO6	Build an interface between PSoC and peripherals to provide solutions to the real world problems	Analyze

LIST OF EXPERIMENTS

PROGRAMMES ON ARM7 (LPC2148)

Week-1	LED BLINKING

Program to toggle all the led to port and with some time delay.

Week-2	INTERFACING OF LCD

Interface LCD to ARM7 and display message on screen.	
Week-3	**INTERFACING OF KEYPAD**
Interface keypad with ARM7.	
Week-4	**INTERFACING OF LED**
Interface LED with ARM7.	
Week-5	**INTERFACING OF STEPPER MOTOR**
Stepper motor interfacing.	
Week-6	**INTERFACING OF DC MOTOR**
DC motor interfacing**.**	
PROGRAMMES ON PSOC (CY8C29466,24X1)	
Week-7	**PROGRAMMABLE GAIN AMPLIFIER**
Study and characterization of the Programmable Gain Amplifier (PGA): Gain Bandwidth Product.	
Week-8	**FILTERS**
Realization of Low pass, High pass and Band pass filters and their characterization.	
Week-9	**ADC AND DAC**
Experiments with on-chip ADC's and DAC's.	
Week-10	**DIGITAL FUNCTION IMPLEMENTATION**

Digital Function Implementation using Digital Blocks.
    a.   Timer experiment
    b.   Counter for blinking LED
    c.   PWM experiment
    d. Digital buffer and digital inverter.	

Week-11	**ALU OPERATIONS**
Logical/Arithmetic function implementation using Microcontroller.	
Week-12	**TIMER**
Timer operation in different Modes.	
Reference Books:	
1. Michael J. Pont, "Embedded C", Pearson Education, 2nd Edition, 2008. 2. Nigel Gardner, "The Microchip PIC in CCS C". Ccs Inc, 2nd Revision Edition, 2002.	

SOFTWARE AND HARDWARE REQUIREMENTS FOR 18 STUDENTS

SOFTWARE:
System Software: Microsoft windows/ Linux.
Programming Languages: Keil Embedded C.

HARDWARE:
20 numbers of Intel Desktop Computers with 2 GB RAM
Dot matrix Printers: 02