EMBEDDED SYSTEM LABORATORY

VII Semester: ECE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
AEC111	**Core**	-	-	3	2	30	70	100

Contact Classes: Nil	Total Tutorials: Nil	Total Practical Classes: 36	Total Classes: 36

I. COURSE OVERVIEW:

This laboratory course builds on the lecture course "Embedded Systems" which is mandatory for all students of electronics and communication engineering. The course aims at practical experience with the programming of different I/O devices using embedded C and keil tool .

II. OBJECTIVES:

The course should enable the students to:

I. Demonstarte Keil IDE tool for development of Embedded system
II. Program the interfacing of various devices with 8051 using Embedded C
III. Develop program for implementation of interrupts and serial communications.

III. COURSE OUTCOMES:

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

CO 1	**Demonstrate** the tool chain for Keil IDE (Embedded Systems Development Tool Chain) using LED Blinking Program.	Apply
CO 2	**Build** the program to interface LED, LCD, Switch and seven segment display with 8051 to display the data.	Apply
CO 3	**Analyze** the program to transfer data from microcontroller to PC by using serial communication.	Analyze
CO 4	**Examine** the program to interface sensor and motor with 8051 microcontrollers to measure the temperature and motor directions.	Analyze
CO 5	**Analyze** the interfacing connections of analog to digital converter(ADC) and digital to analog converter (DAC) with 8051 microcontrollers.	Analyze
CO 6	**Build** the program to interface relay and interrupt with 8051 for industrial and control room's applications.	Apply

IV. SYLLABUS:

LIST OF EXPERIMENTS

Week-1	DEVELOP PROGRAM USING KEIL IDE TOOL

Design and develop a reprogrammable embedded computer using 8051 microcontrollers and to show the following aspects.

    a. Programming
    b. Execution
    c. Debugging

To Demonstrate the Tool Chain for Keil IDE (Embedded Systems Development Tool Chain) with the example of LED Blinking Program.

Week-2	INTERFACING LED WITH DIFFERENT PORT PINS

a)Program to toggle all the bits of port P1 continuously with 250 ms delay
b)Program to toggle only the bit P1.5 continuously with some delay

Week-3	INTERFACING BUZZER AND SWITCH

Program to interface a switch and a buzzer to two different pins of a port such that the buzzer should sound as long as the switch is pressed.

Week-4	INTERFACING LCD DISPLAY

Program to interface LCD data pins to port P1 and display a message on it using P89V51RD2	
Week-5	**INTERFACE HEXA KEYPAD**
Program to 4*4 interface keypad. Whenever a key is pressed, it should be displayed on LCD	
Week-6	**INTERFACE SEVEN SEGMENT DISPLAY**
Program to interface seven segment display using 89V51RD2	
Week-7	**SERIAL COMMUNICATION INTEFACING**
Program for serial communication between Microcontroller to PC communication the data should be transfer from microcontroller to PC terminal window using 89V51RD2	
Week-8	**SERIAL COMMUNICATION INTEFACING**
Program for serial communication between PC to Microcontroller communication the data should be transfer from PC to Microcontroller terminal window using 89V51RD2	
Week-9	**INTERFACING WITH TEMPERATURE SENSOR**
Program to develop necessary interfacing circuit to read data from I) Temperature sensor and process using P89V51RD2, the data has to display terminal window	
Week-10	**INTERFACING STEPPER MOTOR**
Program to interface Stepper Motor to rotate the motor in clockwise and anticlockwise directions	
Week-11	**INTERFACING MULTPLE DEVICES**
Program to verify run 2 to 3 tasks simultaneously on P89V51RD2 SDK. Use LCD interface, LED interface, Serial communication.	
Week-12	**INTERFACE ADC DEVICE**
Program to interface ADC device with P89V51RD2 and display value on LCD	
Week-13	**INTERFACE DAC DEVICE**
Program to interface DAC device with P89V51RD2 and observer the analog output in CRO	
Week-14	**INTERFACE RELAY**
Program to interface Relay with P89V51RD2 using transistor	
Week-15	**INTERRUPT**
Program to toggle LEDS using simple INTERRUPT	

Reference Books

1. Lyla B Das, "Embedded Systems", 1st Edition, Pearson Education, 2012.
2. Michael J. Pont, "Embedded C", Pearson Education, 2nd Edition, 2008
3. Raj Kamal, "Embedded Systems: Architecture, Programming and Design", Tata McGraw-Hill Education 2nd Edition, Tata McGraw Hill, 2011.

Web References:

1. https://www.intorobotics.com/8051-microcontroller
2. https://electrosome.com/led-blinking-8051-microcontroller-keil-c-tutorial-at89c51/
3. http://www.8051projects.net/wiki/Keil_Embedded_C_Tutorial

Course Home Page:

HARDWARE: Desktop Computer Systems 36 nos

SOFTWARE: Keil Micro Vision, PSoC Designer 5.0

LIST OF EQUIPMENT REQUIRED FOR A BATCH OF 36 STUDENTS

S. No	Name of the Equipment	Range
1	Power Supply	0-5V DC
2	P89V51RD2 Development kits	--
3	P89C51RD2 Development kits	--
4	Serial communication cables	--