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

OBJECTIVES:
The course should enable the students to:
I.   Demonstrate Keil IDE tool for development of Embeddedsystem
II. Program the interfacing of various devices with 8051 using EmbeddedC
III. Develop program for implementation of interrupts and serialcommunications

COURSE OUTCOMES (COs):
CO1: Understand the basic concepts of embedded system and various applications.
CO2: Discuss the concepts of C and develop the C programming examples with Keil IDE
CO3: Understand the fundamentals of RTOS and its programming
CO4: Develop an examples using embedded software
CO5: Discuss the concepts of advanced processors

COURSE LEARNING OUTCOMES (CLOs):

The students should enable to:
1.   Understand the keil environment and programmingconcepts.
2.   Develop the interfacing concepts like LEDblinking.
3.   Understand the programming concepts of buzzer andswitch
4.   Understand the programming concepts of LCD. todigital.
5.   Understand the programming concepts of hexaKeypad.
6.   Develop the interfacing concepts like seven segment display, steppermotor.
7.   Analyze the Program for serial communication between Microcontroller to PC and viceversa.
8.   AnalyzetheProgramtodevelopnecessaryinterfacingcircuittoreaddatafromI/Odevices.
9.   Develop the interfacing concepts like LCD, LED using P89V51RD2SDK.
10. Develop the interfacing concepts like ADC and DAC using P89V51RD2SDK.
11. Analyze and Develop the interfacing of Relay using P89V51RD2SDK.
12. Develop a Program to toggle LEDS using simpleinterrupt.

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 msdelay
b) Program to toggle only the bit P1.5 continuously with somedelay

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. RajKamal,"EmbeddedSystems:Architecture,ProgrammingandDesign",TataMcGraw-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