

## EMBEDDED PROGRAMMING LABORATORY

<b>I Semester: ES</b>								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
BESB09	Core	L	T	P	C	CIA	SEE	Total
		-	-	3	2	30	70	100
<b>Contact Classes: Nil</b>		<b>Tutorial Classes: Nil</b>		<b>Practical Classes: 36</b>			<b>Total Classes: 36</b>	
<b>I. COURSE OVERVIEW:</b>								
<p>This course outlines the design and implementation of embedded systems using suitable hardware 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.</p>								
<b>II. COURSE OBJECTIVES:</b>								
<b>The students will try to learn:</b>								
<ul style="list-style-type: none"> <li>I. Use embedded C for reading data from port pins.</li> <li>II. he interfacing of data I/O devices with microcontroller.</li> <li>III. The serial communication and port RTOS on microcontroller.</li> </ul>								
<b>III. COURSE OUTCOMES:</b>								
<b>After successful completion of the course, students should be able to:</b>								
CO 1	Make use of emulators and cross-compilers for writing, compiling and running an embedded C language programs on training boards.						Apply	
CO 2	Develop Embedded C language programs for accomplishing code to reading the data from ports, blinking the LED and interfacing of switch and buzzer and temperature sensors to the microcontrollers.						Apply	
CO 3	Select suitable RTOS of microcontroller and write Embedded C language program to run 2 to 3 tasks simultaneously.						Apply	
CO 4	Choose serial or parallel communication for transmitting the data between microcontroller and peripherals.						Apply	
CO 5	Utilize the Analog to Digital and Digital to Analog converters with micro-controller for data conversion.						Apply	
CO 6	Build an interface between micro controller and peripherals to provide solutions to the realworld problems.						Analyze	
<b>LIST OF EXPERIMENTS</b>								
<b>Week-1</b>	<b>LED BLINKING</b>							
Program to toggle all the bits of port P1 continuously with 250 ms delay.								
<b>Week-2</b>	<b>INTERFACING OF SWITCH AND BUZZER</b>							

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-3**      **INTERFACING OF LCD**

Program to interface LCD data pins to port P1 and display a message on it.

**Week-4**      **INTERFACING SEVEN SEGMENT DISPLAY**

Program to interface seven segment display.

**Week-5**      **INTERFACING OF KEYPAD**

Program to interface keypad. Whenever a key is pressed, it should be displayed on LCD.

**Week-6**      **SERIAL COMMUNICATION**

Program to transmit message from microcontroller to PC serially using RS232.  
Program to receive a message from PC to microcontroller serially using RS232

**Week-7**      **INTERFACING OF STEPPER MOTOR**

Program to interface Stepper Motor to rotate the motor in clockwise and anticlockwise directions

**Week-8**      **INTERFACING TEMPERATURE SENSOR**

Program to read data from temperature sensor and display the temperature value.

**Week-9**      **PORTING OF RTOS**

Port RTOS on to 89V51 Microcontroller and verify. Run 2 to 3 tasks simultaneously on 89V51 SDK. Use LCD interface, LED interface, Serial communication.

**Week-10**      **INTERFACING OF ADC**

Program to convert analog signal into digital (ADC).

**Week-11**      **INTERFACING OF DAC**

Program to convert Digital into Analog (DAC).

**Week-12**      **INTERFACING OF ELEVATOR**

Program to interface Elevator.

**Reference Books:**

1. Michael J. Pont, "Embedded C", Pearson Education, 2<sup>nd</sup> Edition, 2008.
2. Nigel Gardner, "The Microchip PIC in CCS C". Ccs Inc, 2<sup>nd</sup> Revision Edition, 2002.

## **SOFTWARE AND HARDWARE REQUIREMENTS FOR 18 STUDENTS**

### **SOFTWARE:**

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

### **HARDWARE:**

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