



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

## COURSE CONTENT

EMBEDDED SYSTEM PROGRAMMING LABORATORY								
I Semester: ES								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
BESE11	Core	L	T	P	C	CIA	SEE	Total
		0	0	4	2	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45			Total Classes: 45			
Prerequisite: Embedded C and Microcontrollers.								

### I. COURSE OVERVIEW:

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.

### II. COURSES OBJECTIVES:

#### The students will try to learn

- I. Use embedded C for reading data from port pins.
- II. The interfacing of data I/O devices with microcontroller.
- III. The serial communication and port RTOS on microcontroller

### III. COURSE OUTCOMES:

At the end 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 training boards.
- CO2 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.
- CO3 Select suitable RTOS of microcontroller and write Embedded C language program to run 2 to 3 task simultaneously.
- CO4 Choose serial or parallel communication for transmitting the data between microcontroller and peripherals.
- CO5 Utilize the Analog to Digital and Digital to Analog converters with micro-controller for data conversion.
- CO6 Build an interface between microcontroller and peripheral stop provide solutions to the real world problems.

### IV. LIST OF EXPERIMENTS:

#### Week-1: LED BLINKING

Program to toggle all the bits of port P1 continuously with 250ms delay.

#### Week-2: INTERFACING OF SWITCH AND BUZZER

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 anti-clock wise directions  
program to toggle all the bits of port P1 continuously with 250ms delay.

**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.

**Week-13: INTERFACING OF SERVO MOTOR**

Program to interfacing of servo motor

**Week-14: INTERFACING OF LCD DISPLAY**

Program to interfacing of LCD displays

**V. 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.
-