



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

ARM CORTEX ARCHITECTURE AND PROGRAMMING LABORATORY								
II Semester: ES								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
BESD24	Core	L	T	P	C	CIA	SEE	Total
		-	-	4	2	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45				Total Classes: 45		
Prerequisite: Embedded C.								

I. COURSE OVERVIEW:

This laboratory course is designed to provide students with practical experience in designing and implementing ARM Cortex Architecture and Programming Laboratory. The following experiments are to be performed on ARM Cortex- M TM4C123 Microcontroller using Embedded C.

II. COURSES OBJECTIVES:

The students will try to learn

- I. Writing embedded C programs for ARM microcontrollers.
- II. Using Sy stick counter of ARM microcontrollers.
- III. Programming the interrupts of ARM microcontrollers
- IV. Interfacing sensors with ARM microcontrollers

III. COURSE OUTCOMES:

At the end of the course students should be able to:

- CO1 Develop embedded C programs for ARM microcontrollers
- CO2 Develop embedded C programs for transmit & receive data using UART
- CO3 Develop embedded C programs for delay functions using timers
- CO4 Develop embedded C programs for interfacing sensors with ARM microcontrollers
- CO5 Develop Embedded Systems with “ARM Cortex M4” powered “STM32” Microcontroller.
- CO6 Learn how to interpret the content of a message received through UART.

IV. LIST OF EXPERIMENTS:

WEEK-1: INTRODUCTION TO ARM CORTEX-M TM4C123 MICROCONTROLLER USING EMBEDDED C

Reading switches and displaying on LEDs.

WEEK-2: ARM CORTEX-M TM4C123 MICROCONTROLLER USING EMBEDDED C:

Initializing and displaying message on LCD display.

WEEK-3: TRANSMITTING DATA USING UART

Transmitting data using UART.

WEEK-4: RECEIVING DATA USING UART

Receiving data.

WEEK-5: TOGGLING LED USING SYS TICK COUNTER

Toggling LED.

WEEK-6: IMPLEMENTING DELAY FUNCTION USING TIMERS

Implementing delay function using Timers.

WEEK-7: USING GPIOF INTERRUPT

Using GPIOF interrupt.

WEEK-8: USING SYS TICK INTERRUPT

Using Sys Tick interrupt.

WEEK-9: INTERRUPT PRIORITY DEMONSTRATION

Interrupt priority demonstration.

WEEK-10: INTERFACING LM34 TEMPERATURE SENSOR

Interfacing LM34 temperature sensor.

WEEK-11: COMMUNICATING WITH REAL TIME CLOCK USING I2C

Communicating with Real time clock using I2C.

WEEK-12: USING PWM MODULE TO CONTROL LED INTENSITY

Using PWM module to control LED intensity.

WEEK-13: AUTOMATIC CAR PARKING SYSTEM USING ARM

An automatic Design and implement car parking system using ARM.

WEEK-14: OBJECT DETECTION USING ARM

Design and implement an object detection using IR Sensor using ARM

V. TEXT BOOKS:

1. Microcontroller Based Embedded Systems Laboratory Manual, Steve Furber, ARM System on Chip Architecture, 2nd edition, New Delhi: Dorling Kindersley (India) Pvt. Ltd., 2000.

VI. REFERENCE BOOKS:

1. Muhammad Ali Mazidi, Shujen Chen, Sarmad Naimi, Sepehr Naimi, TI ARM.
2. Peripherals Programming and Interfacing Using C Language for ARM Cortex, Mazidi and Naimi, 2014.
3. Jonathan Valvano, Embedded Systems: Real-Time Operating Systems for Arm Cortex Microcontrollers, Charleston: Create Space Independent Publishing Platform, 2012.

VI. MATERIALS ONLINE

1. Course Template
2. Laboratory Manual